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Cutoffs

It isn't unusual to find myself working on a project that takes me out of the shop. Whether it's working around the house, helping out friends and family, or just enjoying a nice day outside, I need a way to bring my tools along with me. So in this issue, we have a couple of projects that make it easier to get what you need right where you need it.

High-Tech Tool Chest. Woodworkers have been building tool chests for hundreds of years. But a box that's strong enough to house a lot of tools is usually going to be heavy and difficult to move. So the challenge was to come up with a *lightweight*, sturdy design for our tool chest.

To keep the weight down, we started with ¼" plywood panels. Then the panels were riveted to pieces of aluminum angle. Now I know this sounds a bit unusual, but it really works quite well. The aluminum angle provides a rock-solid joinery method and protects the corners of the case as well. For more on building your own high-tech tool chest, check out the article on page 16.

Multi-Purpose Table. Another project you'll want to take a look at is the table on page 36. Here we've packed a small but surprisingly stable worktable in a compact package that's easy to carry outside or throw in the car (or RV) when you travel. Who says you can't take it with you?

Terry

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from our Readers

Tips for Your Shop

Saw Blade Storage Case

Finding a place to store all of the saw blades for my circular saw, miter saw, and table saw has always been a problem. I needed to find a way to store them in an organized fashion and protect the carbide teeth from chipping.

The blade storage cabinet you see above is what I came up with. The pull-out trays let me store a number of blades in a small space. And the blades nestle in custom cutouts in the trays to protect the the teeth from chipping.

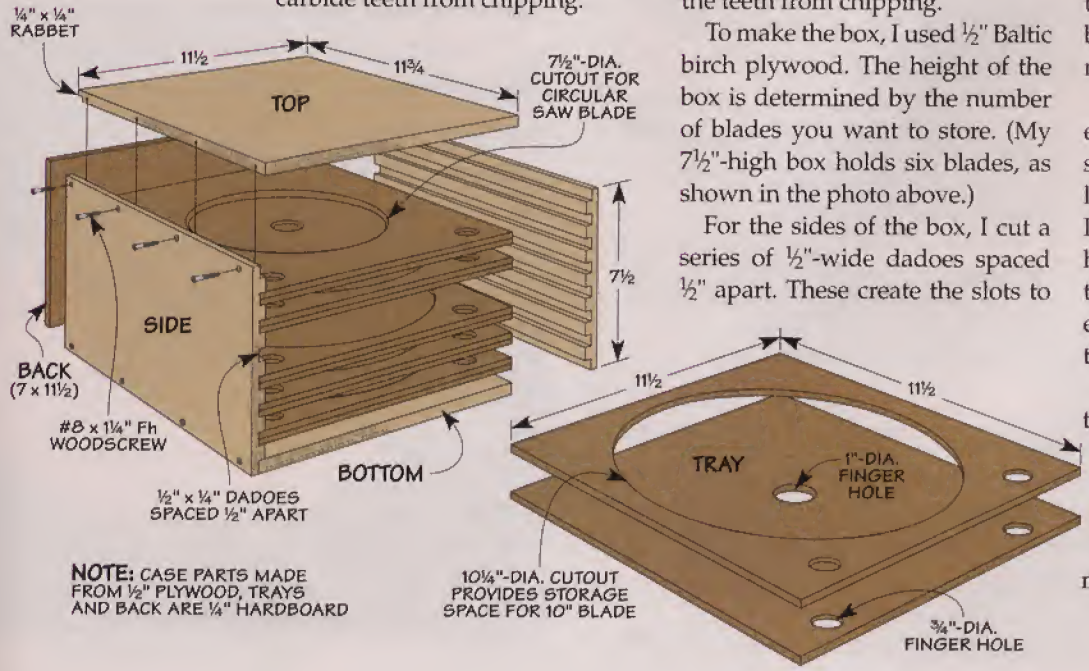
To make the box, I used ½" Baltic birch plywood. The height of the box is determined by the number of blades you want to store. (My 7½"-high box holds six blades, as shown in the photo above.)

For the sides of the box, I cut a series of ½"-wide dadoes spaced ½" apart. These create the slots to hold the sliding trays. Then I cut rabbets on the ends of the side pieces to accept the top and bottom panels of the box. The last step is to cut a ¼" rabbet on the back edges of all four pieces to accept the back panel. I assembled the box with glue and screws before making the trays.

Each tray is made from two layers of ¼" hardboard as you can see in the drawing at left. The top layer is cut out to house the blade. I used a circle-cutting jig on my hand-held router to do this. I sized the circle about ¼" larger in diameter than the blade to make it easy to remove from the tray.

After gluing the two layers together, drill a 1"-dia. hole in the bottom layer. This lets you easily push the blade up to remove it from the tray. Two ¾"-dia. finger holes in the front of each tray make it easy to slide the tray out.

Robert Brosbe
Lancaster, Pennsylvania



Conduit Compass & Router Trammel

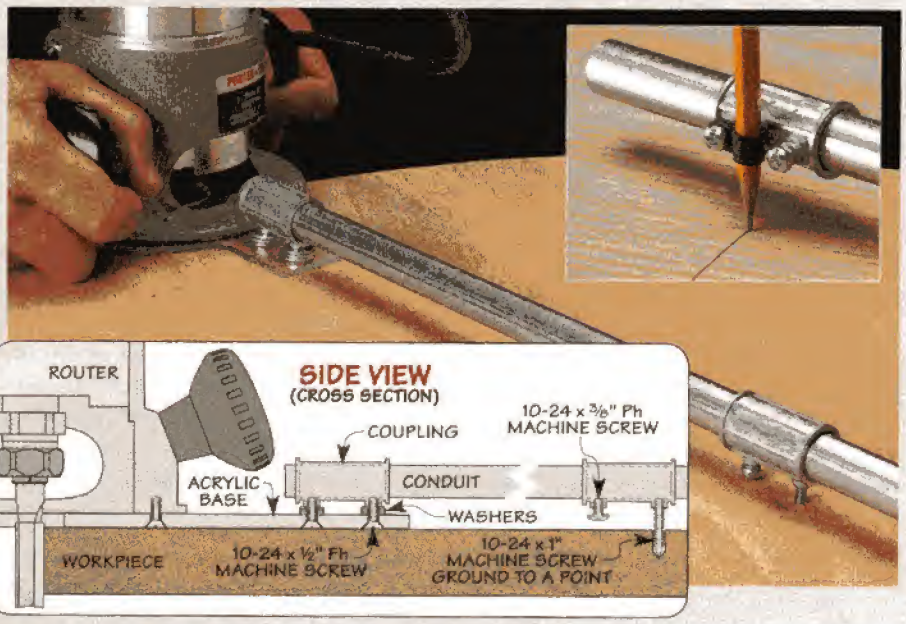
While in the process of building a round table, I found a quick, inexpensive way to make a beam compass and router trammel using ½"-dia. electrical conduit. You can see these in the photos below.

For the beam compass, I used a plastic cable clamp to hold a pencil (inset photo below). And for the trammel, I made a custom baseplate for my router that fastens to the coupling, as shown in main photo and drawing below.

You can find screws at your hardware store to fit the threads in the couplings. For the trammel "centerpoint," I used a longer screw, cut off the head, and ground it to a point.

You'll need to modify the couplings a bit so they'll slide completely over the conduit. I did this by filing out the ridge on the inside of the coupling. With the internal ridge removed, you can easily adjust the position of the coupling along the length of the conduit and tighten the screw to keep it in position.

Robert Curtis
Big Lake, Minnesota



Submit Your Tips

If you have an original shop tip, we would like to hear from you and consider publishing your tip in one or more of our publications. Just go online to our web site at *www.ShopNotes.com* and click on the link, "SUBMIT A TIP." Or you can mail your tip to: *ShopNotes* Tips for Your Shop, 2200 Grand Avenue, Des Moines, IA 50312. Please include your name, address, and daytime phone number (in case we have any questions). We will pay up to $200 if we publish your tip.

The Winner!

Congratulations to *Robert Curtis* of Big Lake, Minnesota. His router trammel and beam compass (shown at the top of the page) made from electrical conduit are handy additions to the shop. His tip was selected as winner of the *Porter-Cable* router, just like the one shown at right.

To find out how you could win a *Porter-Cable* router, check out the information above. Your tip just might be a winner.

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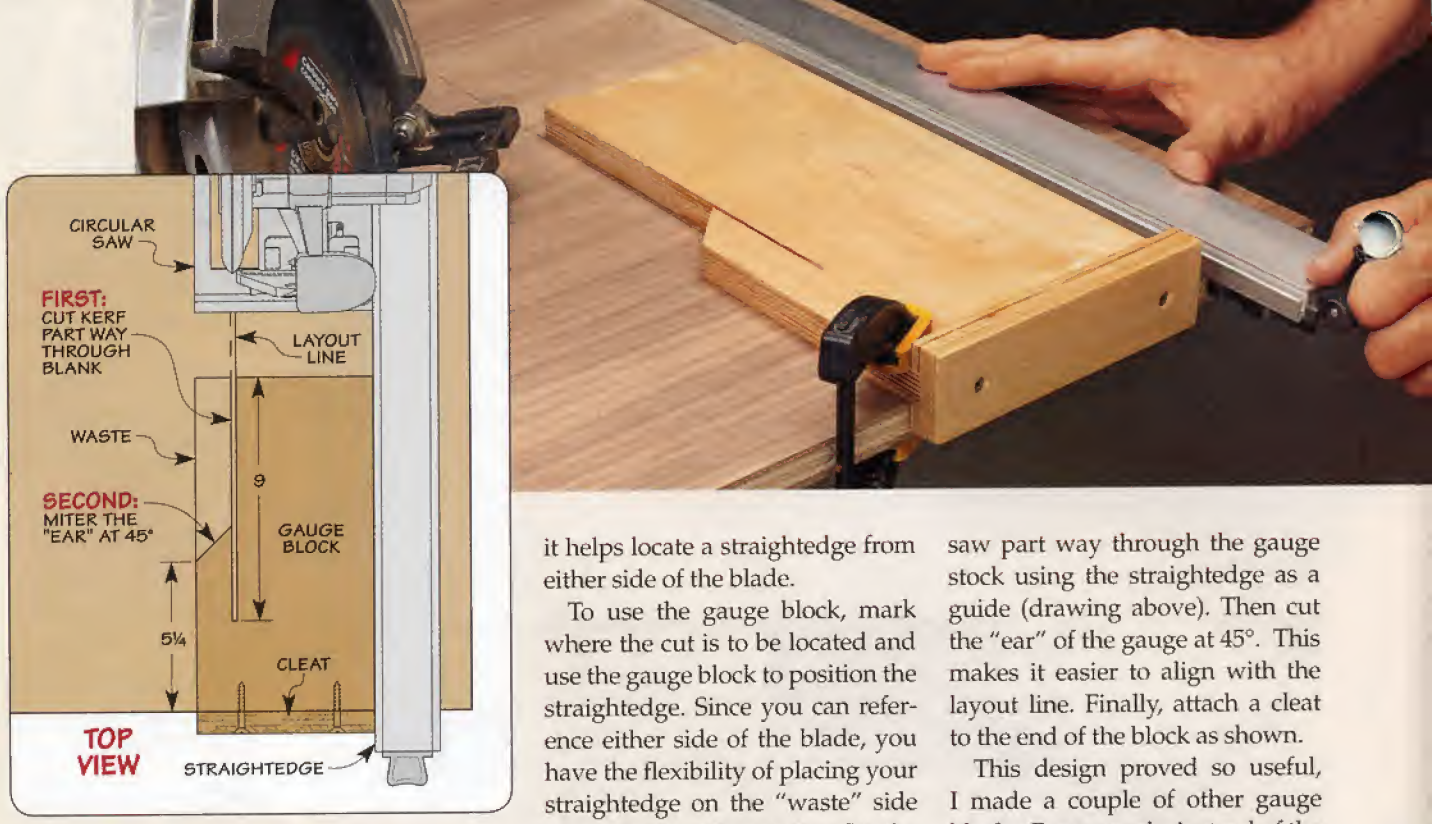


Shop-Made Gauge Block

A shop-made gauge block is great for locating a straightedge when cutting or routing stock. The design shown above is what I came up with. The nice thing is it helps locate a straightedge from either side of the blade.

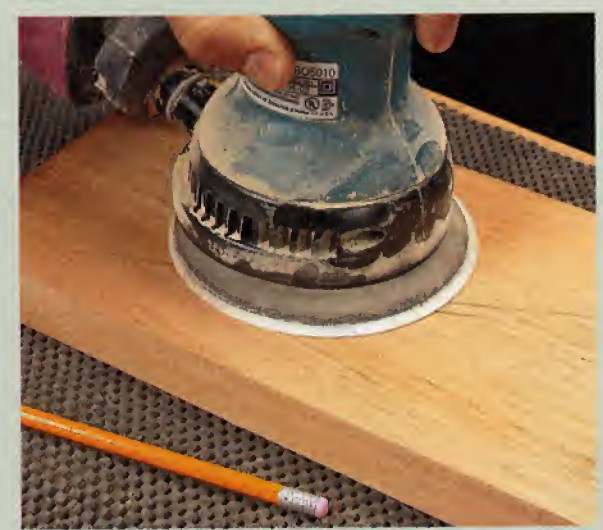
To use the gauge block, mark where the cut is to be located and use the gauge block to position the straightedge. Since you can reference either side of the blade, you have the flexibility of placing your straightedge on the "waste" side or good side of the cut. Just flip the block over and align the kerf with your layout line.

When making the gauge, start with a large blank of plywood (about 7"x12"). Then butt the edge of the blank against a straightedge. Now, with the blade in your circular saw set as deep as possible, saw part way through the gauge stock using the straightedge as a guide (drawing above). Then cut the "ear" of the gauge at 45°. This makes it easier to align with the layout line. Finally, attach a cleat to the end of the block as shown.

This design proved so useful, I made a couple of other gauge blocks. For example, instead of the saw kerf you see above, I routed a ½"-wide slot to help locate a straightedge for routing ½" dadoes. With a number of gauge blocks on hand, you'll save time when setting up the cut.

John Gonser
Grand Rapids, Michigan

Quick Tips



▲ *Use a pencil to trace scratches and make them easier to see when sanding.* ***David McGuffin*** *of Louisville, Kentucky says that tracing them also serves another purpose. When the pencil marks are gone, you'll know that the scratches are gone, too.*

▲ ***John Beckord*** *of Janesville, Wisconsin uses rare-earth magnets as a "pre-filter" for the floor sweep on his dust collection system. The magnets help catch steel screws, nails, and other ferrous metals before they get into the dust collector. Note: They won't snag brass or aluminum pieces, so you'll still need to look out for those items.*

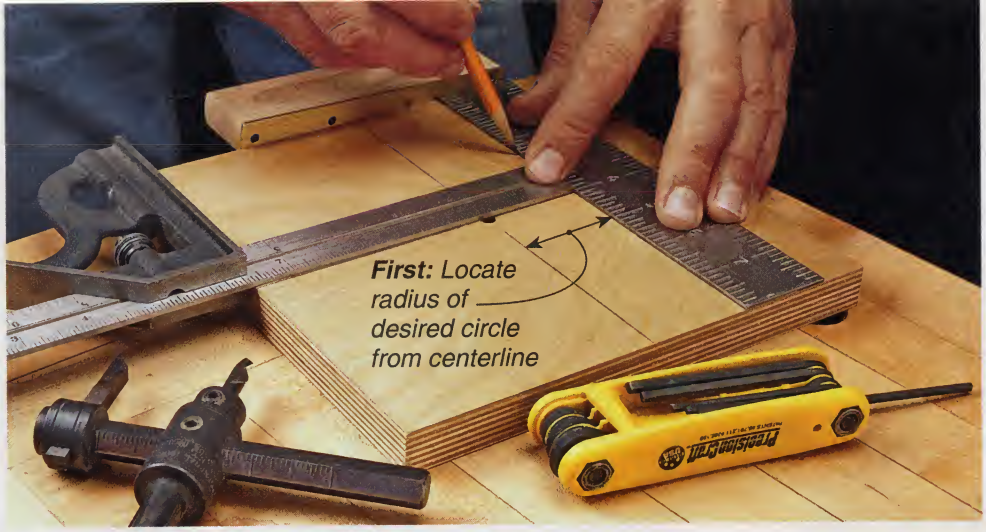
Circle Cutter Set-up Gauge

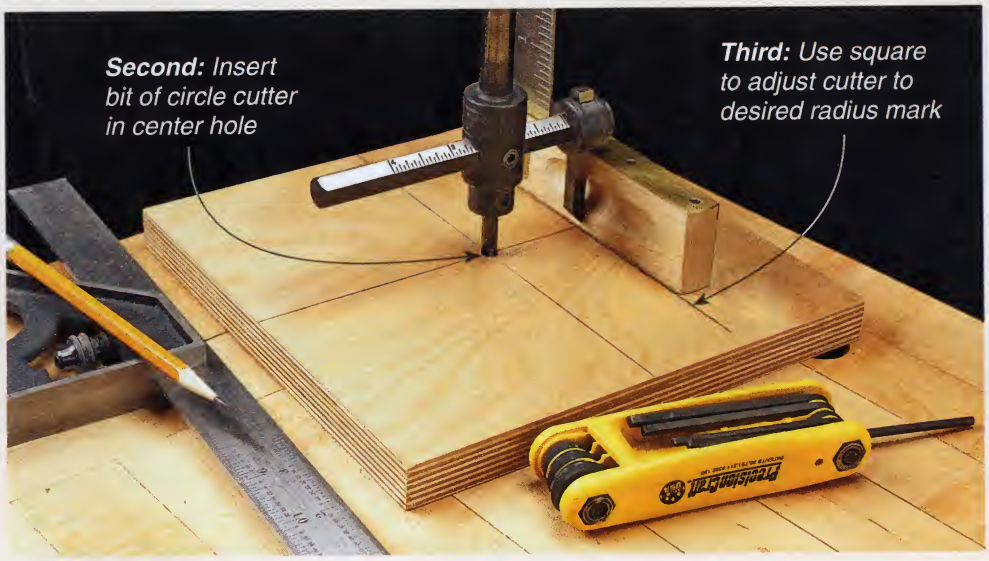
I've been using a circle cutter a lot lately and got tired of setting the diameter using the gauge stamped on the cross bar. It's awkward and not too accurate.

So to get around this problem, I found a scrap piece of plywood, cut it square, and marked a cross through the center of the piece, as you can see in the upper photo. Then I drilled a centered hole using the guide bit on the circle cutter. That's all there is to it.

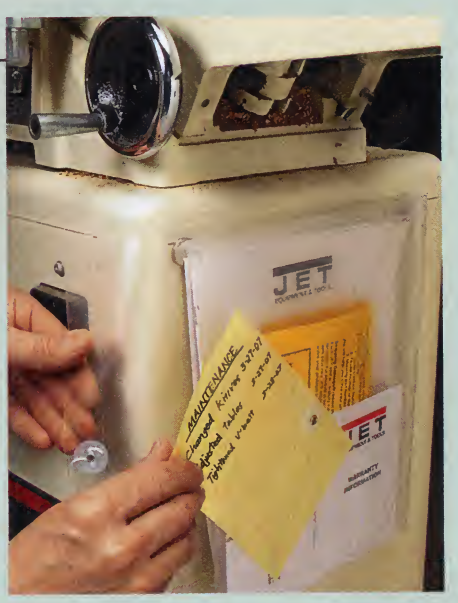
Using the gauge is easy. Just mark the radius of the desired circle on one of the centerlines you made earlier and place the circle cutter in the guide hole (bottom photo at right). You can use a square to position the cutting knife so it's aligned with the radius mark, and tighten the set screw. All you need to do now is mount the circle cutter in your drill press and cut out the circle. The result? A perfectly sized cutout every time.

Fiske Miles
Kansas City, Missouri





▲ *A die grinder with an extended shaft and some sanding stars make a great profile sander, as* ***Milton Bates*** *of Adamsville, Tennessee discovered. The air-powered die grinder works great in tight areas.*



▲ *Keeping track of the documents and small parts that come with power tools is tricky.* ***Paul Krause*** *of Titusville, Florida uses plastic pouches fastened with rare-earth magnets or carpet tape.*

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the ultimate cut
Spiral Bits

Try these bits for quickly cutting joinery and getting flawless plywood panels.

When it comes to making rabbets, dadoes, grooves, mortises, and even box joints, I rely on my router and a set of straight bits. Straight bits are, without a doubt, a shop workhorse. But I've found ordinary straight bits aren't always the best choice for every joinery task.

For one thing, a straight bit tends to cut fairly slowly, which can lead to burning. It also often causes chipout, especially when routing plywood. And don't even think about using a traditional, straight bit for cutting a deep mortise. It will pack the mortise full of chips, which can cause overheating and shorten the life of the bit.

To avoid these problems, I turn to a pair of spiral bits. I trust them to deliver perfect cuts in any material, with considerably less noise, vibration, and effort.

THE SPIRAL ADVANTAGE

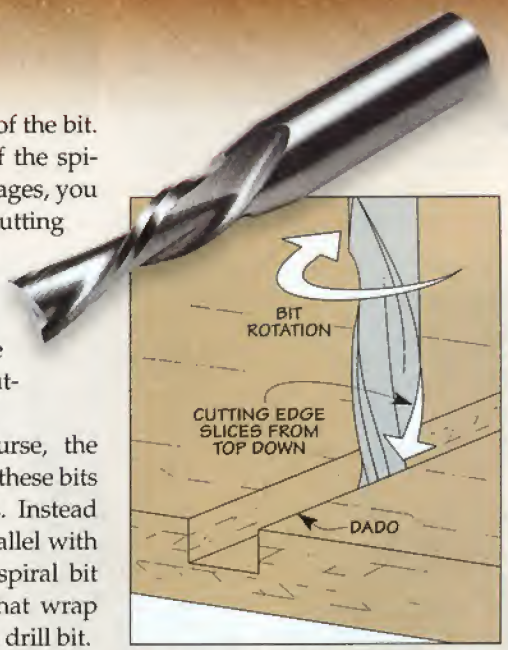
The secret for getting these top-notch results lies in the shape of the cutting flutes. A spiral bit cuts in two directions at the same time.

Let's start with the tip of the bit. If you look at the end of the spiral bits shown on these pages, you can see that they have cutting edges running across the bottom. This allows a spiral bit to plunge into a workpiece to make a stopped cut — like routing a mortise or a dado.

Spiral Edges. Of course, the most unique thing about these bits is the side-cutting flutes. Instead of the flutes running parallel with the length of the bit, a spiral bit has two cutting edges that wrap around it — almost like a drill bit.

This shape offers a few benefits. The main advantage is a smoother cut. The spiral cutting edges contact the workpiece at an angle as they make the cut. This produces a shearing action that removes material quickly and leaves behind a smooth surface.

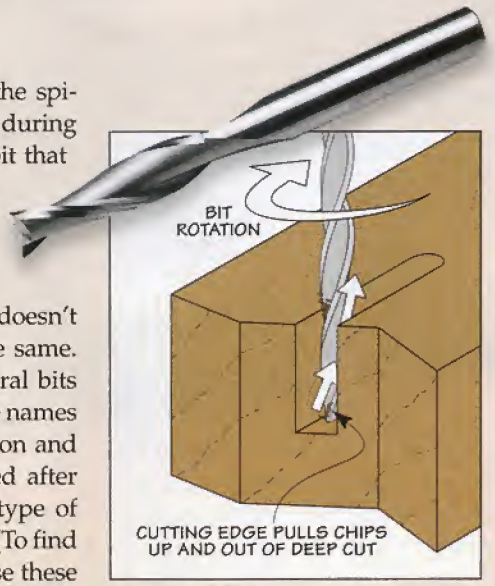
On a traditional straight bit, the flutes "chop" into the workpiece. This hammering effect is hard on both the bit and router motor, and can lead to chipout on the faces and ripples along the edges of the cut. But on a spiral bit, a small part of the cutting edge is always in contact with the workpiece. The result is reduced vibration and less stress on the router motor and bit.



▲ ***Downcut Bit.*** *The cutting flutes on this bit prevent tearout on the top face of the workpiece.*

The final advantage of the spiral flutes is what happens during the cut. Unlike a straight bit that throws chips straight out the side of the cut, a spiral bit's flutes draw chips away from the cut edge.

Two Types. Now, that doesn't mean all spiral bits are the same. There are two types of spiral bits — downcut and upcut. The names describe the cutting direction and how the chips are removed after the cut. This makes each type of bit suited to a specific task. (To find out where you can purchase these bits, turn to Sources on page 51.)



▲ ***Upcut Bit.*** *The flutes of an upcut bit allow the bit to cut mortises fast with a plunge router.*

DOWNCUT FOR DADOES

Routing chipout-free dadoes in plywood is one of the challenges I mentioned earlier. The problem is that the thin face veneer can fray and tear out as the bit cuts.

The solution to this problem is a downcut spiral bit, as you can see in the main photo on the opposite page. I use a ⅜"-dia. bit. This is a versatile bit that allows you to rout dadoes, grooves, and rabbets.

As the bit spins, the spiral cutting edges slice from the top down into the workpiece, channeling the chips down. Since the cutting action is downward, the top face of the workpiece is fully supported and can't chip out.

The cutting action does have a downside. Since the chips are forced down, they can get packed into a dado or groove. That's why I only use a downcut bit for shallow cuts (½" deep or less).

UPCUT FOR MORTISES

When it comes to making deeper cuts, like mortises, you need to switch to an upcut bit, like you see in the photos above. With an upcut bit, the chips are pulled out of a cut and towards the router.

The advantage here is that the bit quickly clears chips out of deep cuts to prevent them from clogging (drawing above). This makes an upcut bit perfect for mortising.

Spiral upcut bits come in a range of sizes. But I've found that a ¼"-dia. bit is ideal for most mortising tasks in my shop.

There is one thing to point out about using an upcut bit. As the bit cuts, the lifting action of the flutes may cause the top of a mortise to fuzz or tear slightly. There's no need to worry about this because the top edge will be hidden by the shoulders of the mating tenon. You can use a file to chamfer the edge slightly to remove any tearing that may affect the fit of the joint.

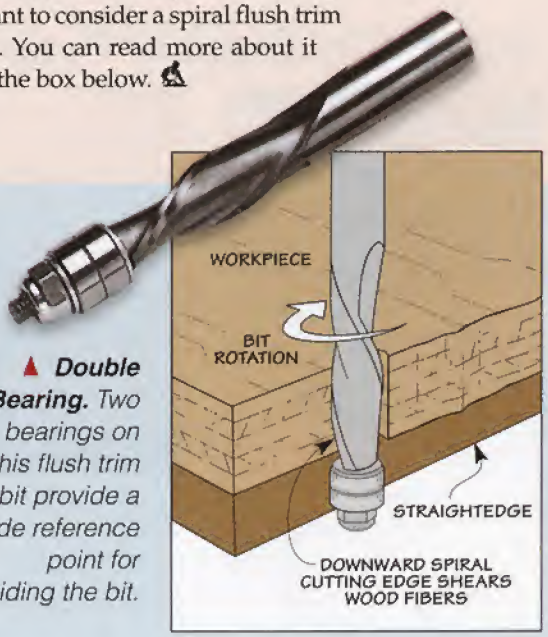
Edge Cuts. Upcut and downcut bits both work best for cuts that don't go all the way through a workpiece. For edge cuts like trimming a plywood panel to size or routing with a template, you may want to consider a spiral flush trim bit. You can read more about it in the box below.

Perfect Plywood Edges: No Tearout

Having been frustrated by tearout when cutting plywood panels to size, I was looking for a solution. What I came up with is a two-step process to get clean edges.

Rough Cut, Then Rout. The trick is to cut the plywood pieces slightly oversize first. Then, I trim the panels to size with a spiral flush trim bit and straightedge. This type of flush trim bit has the same benefits of the spiral bits mentioned above.

The one you see here has downcutting flutes to prevent chipout on the top face. The bottom face of the plywood is backed up by the straightedge. Now you can get smooth, perfect edges and never worry about tearout again.



▲ ***Double Bearing.*** *Two bearings on this flush trim bit provide a wide reference point for guiding the bit.*

great results with Water-Based Finishes

Selecting and applying a durable finish is easy once you understand the basics.

Finishing is one of those tasks that a lot of woodworkers would just as soon skip. Trying to apply a smooth, durable finish to a project can take a lot of time and effort. That's where water-based finishes can come to the rescue.

There are a lot of benefits to using a water-based finish. It dries quickly (often within a few hours) and leaves a protective, clear surface. Plus, you don't have to worry about strong odors filling the shop. And when it comes time to clean up, all you need is a little soap and water to do the job.

Many woodworkers tend to shy away from water-based finishes because of the belief that they aren't as "good" or don't hold up as well as oil-based products. But the chemistry of water-based finishes has come a long way in the last several years. And that opens up many options for putting a better finish on your projects.

FINISH TYPES

The wide variety of finishes is evident as soon as you walk down the store aisle. You'll find an ever-growing selection on the shelves. But finding the right one can be confusing. There are polyurethane and acrylic types, and then there are the "poly-acrylic" blends.

So how do you know which type is right for your project? To help me understand the differences, I spoke with Tom Monahan, owner

Brush On Bubble Free

▲ ***No Bubbles Dip.*** *After dipping the brush, don't drag the brush across the lip. Drain the excess by touching the side of the jar.*

▲ ***Short Stroke.*** *On flat surfaces, start with a short stroke, brushing toward the outside edge. Doing this helps avoid drips and runs.*

▲ ***Overlapping Strokes.*** *Now, the goal is to apply a full, wet coat of finish with long, smooth overlapping brush strokes.*

▲ ***Use the Tip.*** *Before the finish begins to tack up, hold the brush upright and use the tip to smooth out any bubbles or brush marks.*

End Grain. *Sanding sealer evens out the grain (right). Without it, end grain appears darker (left).*

of *General Finishes*, a manufacturer of stains and finishes. He explained that the differences are in the main resins they use in water-based finishes.

Better Resins. One thing he pointed out is that newer resins are harder with greater water and chemical resistance. That's good news for woodworkers. He went on to explain the different properties of the resins used.

Acrylics for Hardness. Acrylic products are great for a quick, light-duty finish. And for most shop projects, that's all I need. It goes on fast and dries fast. But for a furniture project where you might want even more protection, he suggested a finish that contains urethane (or polyurethane) resin.

Urethane for Wear. Urethane resins have a reputation for durability, so they're a great choice for floors or tabletops. But straight polyurethane products tend to be more expensive than acrylic finishes. That's why manufacturers like *General Finishes* offer a blend of the two resins.

Poly-Acrylic Blends. Blending allows manufacturers to achieve better performance at a reasonable cost. They can "fine-tune" the properties of a finish by altering the blend of resins. A poly-acrylic blend brings together the best properties of both resins, so it's a great, all-around finish.

APPLICATION

Regardless of the type of product, one of the best things about water-based finishes is that they're easy to apply. One thing you'll notice when you open the can is the product's milky appearance. But don't let that concern you — it dries perfectly clear.

Multiple Coats. No matter which clear finish you choose, you'll need to apply several coats to get the best protection. I like to apply at least three coats using a nylon or foam brush.

Raised Grain. Water-based finishes will raise the grain slightly. I don't worry about it on shop projects, but it's something to keep in mind for "finer" projects. All it takes is some light sanding after the first coat to knock down the raised grain before moving on. And you'll want to sand between coats, too. (I like to use 320-grit sandpaper or a synthetic pad.)

Avoiding Bubbles. One of the challenges with water-based finishes is preventing bubbles from becoming trapped in the film. As you can see in the photos at the bottom of the opposite page, the trick is proper application.

Now, I've had my share of problems with bubbles. Usually, they pop and the finish flows out smoothly before the finish cures. But if a few bubbles mar the finish after it dries, you can lightly sand it smooth and then apply another thin coat. Sometimes I'll actually wipe my last coat with a lint-free cloth instead of brushing it on.

Sanding Sealer. I use a lot of water-based finishes in my shop. And for shop projects, there's not a lot of prep work. But for projects that call for a more consistent color, you might want to consider a sanding sealer. Sanding sealer is great for end grain or where finish absorbs unevenly. You can see what I mean in the photos above.

Oil and Water Finish. Finally, as great as water-based finishes are, they don't add a lot of character to the wood. That's why I like to use a "hybrid" finish like you see in the box below.

Oil and Water. *Oil adds color underneath a water-based finish (bottom), unlike a water-based finish alone (top).*

Oil and Water: Making the Grain "Pop"

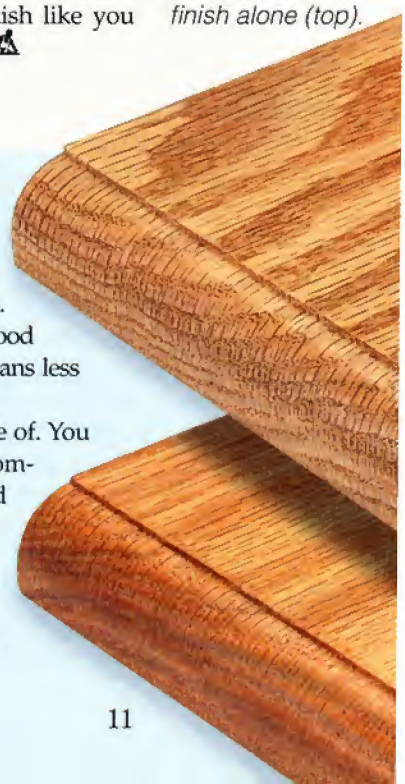
While water-based finishes work great, they're not always the best choice if you want to show off the figure and color of the wood grain on your project. Since they dry clear, they won't add any color to the finish, unlike oil finishes that provide an "amber" tone.

I still like the durability and ease of using water-based finishes, so to get around this shortcoming, I like to use a "hybrid" finish. Before I apply a clear, water-based topcoat, I'll first wipe on a coat of oil finish (like boiled linseed oil).

Using an oil finish prior to a water-based topcoat really makes the grain of the wood stand out (bottom photo at right). And there's another advantage. Oil finishes won't raise the grain of the wood the way water-based finishes do. That means less sanding later when I apply the top coat.

But there's one more thing to be aware of. You need to make sure the oil finish is completely dry before applying a water-based topcoat. This may take a few days, so patience is the key here.

If you take the time to do a little experimenting with a hybrid finish, you'll find it's worth the effort.



low-cost Jig Saw Upgrades

Improve the performance of this jack-of-all-trades tool with these handy accessories.

▲ ***Not Just an Edge Guide.*** *The Milescraft SawGuide keeps your jig saw parallel to an edge while cutting straight lines (above) and also holds the line when cutting perfect circles (top).*

A jig saw is one of the most versatile tools you can own. It can rip, crosscut, and cut intricate curves — truly an all-around saw.

With all that capability, you might wonder how you can make a jig saw even better. The answer to improving its performance is to add the accessories shown here. And you can find out where to get these add-ons by referring to Sources on page 51.

EDGE GUIDE

One of the drawbacks of any saw is the difficulty in keeping the blade on the layout line while cutting. To help with this, the *Milescraft SawGuide* makes it a snap to make straight cuts (inset photo) or circles, as shown in the main photo.

Universal Fit. The *SawGuide* has two main parts — the guide base and an attachment bar. (The package comes with four bars to fit just about any jig saw.)

The metal end of the bar, which has a scale etched in it for quick setup, attaches to your saw through the slots in its shoe, or base. The other end of the bar has a plastic tab, which is notched at 1/16" increments. Once you slide the tab into the guide base, you can fine-tune the saw blade's alignment to match your layout lines.

Circle Cutting. But what really sets this guide apart is its ability to cut circles. To provide accuracy and adjustability, it has two rows of pivot holes in the guide base that are offset from each other. The first step to setting things up is to tap a nail at the center of the circle you want to cut. Then, simply determine which hole gives the desired radius. After slipping the guide over the nail, you're all set to cut a circle to size.

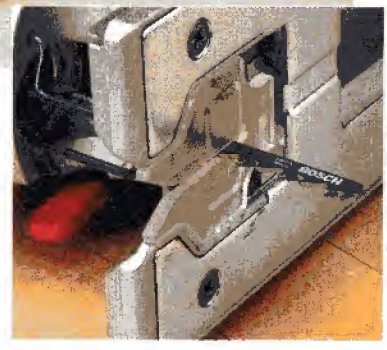
SPLINTER GUARD

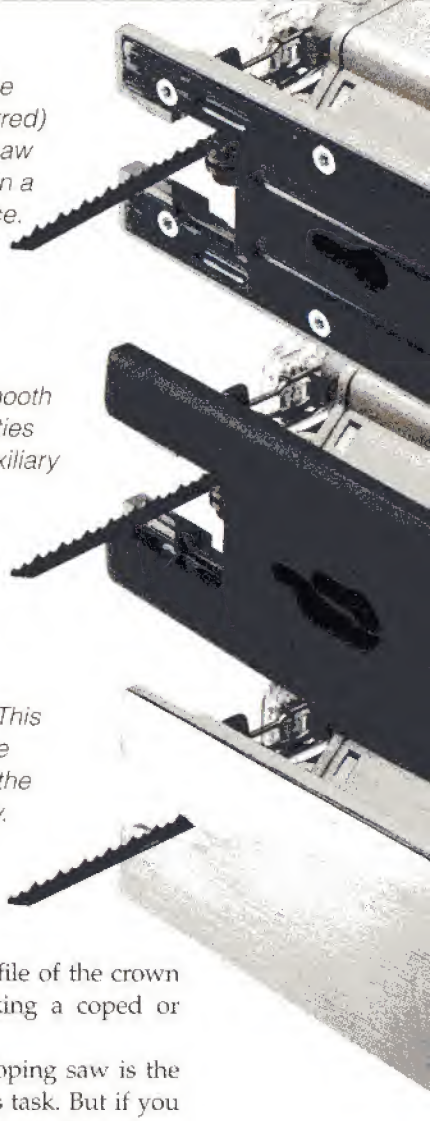
Another problem I've experienced when using my jig saw is chipout and splintering, especially in plywood. One way to reduce this is to install a splinter guard (top left photos on opposite page).

Zero-Clearance. A splinter guard works like a zero-clearance insert on a table saw. It fits around the blade, providing pressure against the kerf to prevent the wood fibers from tearing out.

Custom-Fit. But unlike the *SawGuide*, which will fit any jig saw, splinter guards are custom-fit to each saw. So, if your saw didn't come with one, you'll need to check with your local retailer.

▲ ***Splinter Guard.*** *Installing a splinter guard in your jig saw will reduce chipout.*





► ***Standard.*** *The irregular (or scarred) surface of a jig saw base can result in a marred workpiece.*

► ***Snap-On.*** *Smooth out the irregularities with a plastic auxiliary base cover.*

► ***Stick-On.*** *This overlay can be trimmed to fit the base perfectly.*

BASE COVER

One of the trouble spots on a jig saw is found on its shoe, or base. If you'll look at the base, you'll see it has an irregular surface and some screwheads that could trap sawdust and dirt (top right photo). And that dust and dirt could mar your workpiece. To prevent that, you can add a cover to your saw's base. There are two types available: snap-on covers and adhesive-backed overlays.

Snap-On. The plastic, snap-on base will cover the irregular surface on the base of your saw (middle margin photo). Unfortunately, this isn't a one-size-fits-all accessory, so be sure the one you're considering will attach securely to your saw.

Stick-On. If you can't find a snap-on cover, another option is the *Slick Saw* overlay (bottom margin photo). They come in a couple of different shapes and sizes for jig saws, and they're easily trimmed to fit your saw exactly.

Not only does it protect the workpiece from the base of the saw, but it also reduces friction — almost like the saw is gliding on ice. So, having the overlay reduces the effort it takes to make a cut.

COPING JIG

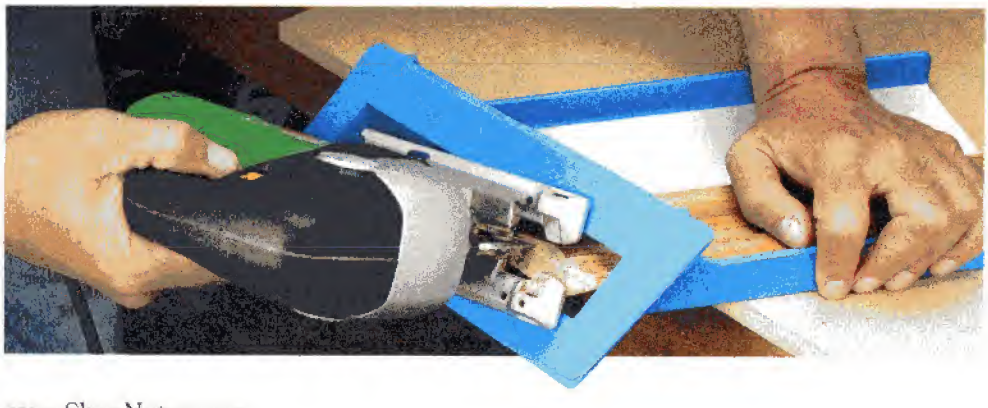
While the accessories up to now have focused on traditional uses for your jig saw, there's another attachment that can turn it into a not-so-traditional tool — a powered coping saw for crown molding (below photo).

EasyCoper. When you install crown molding, a miter may leave a gap when fitting an inside corner. To get a good fit, you need to follow the profile of the crown molding by making a coped or matching cut.

A hand-held coping saw is the usual tool for this task. But if you have a lot of molding to do, using a coping saw can be tedious. That's where the *EasyCoper* comes in.

It comes with two jigs set at right-hand and left-hand angles for coping crown molding. The jigs support the base of the saw while you follow the molding's profile.

As you can see, even the performance of a power tool as versatile as a jig saw can be improved upon. These accessories will go a long way toward getting better results with your jig saw.



◄ ***EasyCoper.*** *The EasyCoper jig holds your saw at the proper angle to cope crown molding. Adding adhesive-backed sandpaper helps hold the molding in the jig.*

5 handy Chisel Tips and Techniques

It's tough to think of a hand tool that gets more use in my shop than my set of chisels. They're a jack-of-all-trades tool that can tackle a wide variety of tasks in a short amount of time. And while it's tempting to just pick up a chisel and start working, you can get better, more consistent results by using the right technique. On these two pages, I've picked out five everyday shop tasks that give you a good overview of some basic chisel techniques.

1 Squaring up a Rabbeted Corner

I often use a router to create an opening for a cabinet back. But the router leaves rounded corners (photo at left). With a chisel, you can square them up in a snap. So this first technique — squaring up a corner — provides a good starting point for mastering your chisels.

The first step, though, is to define the corners with layout lines. In the left photo below you can see what I'm talking about.

Chopping Cuts. Cleaning up the corner is done in two steps. The first step consists of a series of vertical, chopping cuts to define the corner. I use a wide chisel to provide a stable bearing surface to keep the cuts in line with the routed rabbet, as shown in the photo at left. I also hold the chisel on the blade for greater control.

Paring Cuts. The second cut is a horizontal, paring cut that removes the waste (right photo below). Here my left hand is steering the chisel and the right hand provides the power.

You can also see the chisel is positioned bevel up. This allows the wide, flat back to keep the cut even with the bottom of the rabbet.

▲ ***Lay Out Corner.*** *Use a pencil and a combination square to mark the layout lines to guide the chisel.*

▲ ***Remove Waste.*** *After defining the corner with a vertical cut, clean out the waste with a paring cut.*

2 Two Ways to Pare Plugs

Plugs are a good way to disguise the heads of screws. The challenge is trimming them flush. Here's a simple, three-step process that will guarantee great results.

The first thing to do is to cut off the plugs close to the surface with a hand saw. The second step is to use a chisel to trim the plug flush. And doing this depends on the type of plug you use.

End-Grain Plugs. A section of dowel can be used to make an end grain plug for a screw hole. But it's difficult to make a smooth chisel cut across the tough end grain. To trim the plug flush, I start with scoring cuts around the perimeter (photo at right). Then gradually increase the depth until the plug is cut off nearly flush. A last bevel-up cut will trim it smooth.

Face-Grain Plugs. Face-grain plugs are a little simpler. The thing you want to avoid here is having the plug split off below the surface. To prevent this, I take thin cuts across the grain, working down to the surface (inset photo).

Finally, you can touch up the plug and surrounding wood with a little light sanding.

▲ ***The Right Angle.*** *To trim end-grain plugs, make cuts from all sides to avoid breaking off the fibers. On face-grain plugs, a cross-grain paring cut will keep the wood from splitting below the surface.*

No More Glue. *To remove glue from corners, hold the chisel bevel down. Along an edge joint, a vertical, "scraping" cut eliminates glue and protects the surface (inset photo).*

3 Versatile Glue Scraper

Even though removing dried glue squeeze-out is a common task, it's no picnic. The photos at left show two ways a chisel is the perfect tool for the task.

When glue has dried in a corner, like the drawer you see at left, I use a bevel-down grip to "pop" the glue out. The bevel acts as a "safety" to keep the cutting edge from gouging the workpiece.

Squeeze-out on edge joints call for a different approach. Here, you want to hold the chisel nearly vertical and pull it along the glue line (inset photo). This scraping action quickly shears off dried glue.

One more thing: To avoid having to spend a lot of time resharpening my best chisels, I bought an extra, inexpensive chisel just for this job.

4 Trim Edging Flush

Trimming edging flush to the end of a plywood panel may seem like a tricky task. But it's really not much different than trimming an end-grain plug.

Start by rough cutting the edging with a hand saw. Then with a horizontal cut, make several passes to bring the edging flush. To avoid tearout, trim from both edges toward the center. A final, light pass will level out the slight hump in the center of the edging.

5 Marking Knife

▲ ***Layout Tool.*** *To use a chisel as a marking knife, hold the back against the square and tilt it up so the edge won't catch.*

storage solutions

high-tech Tool Chest

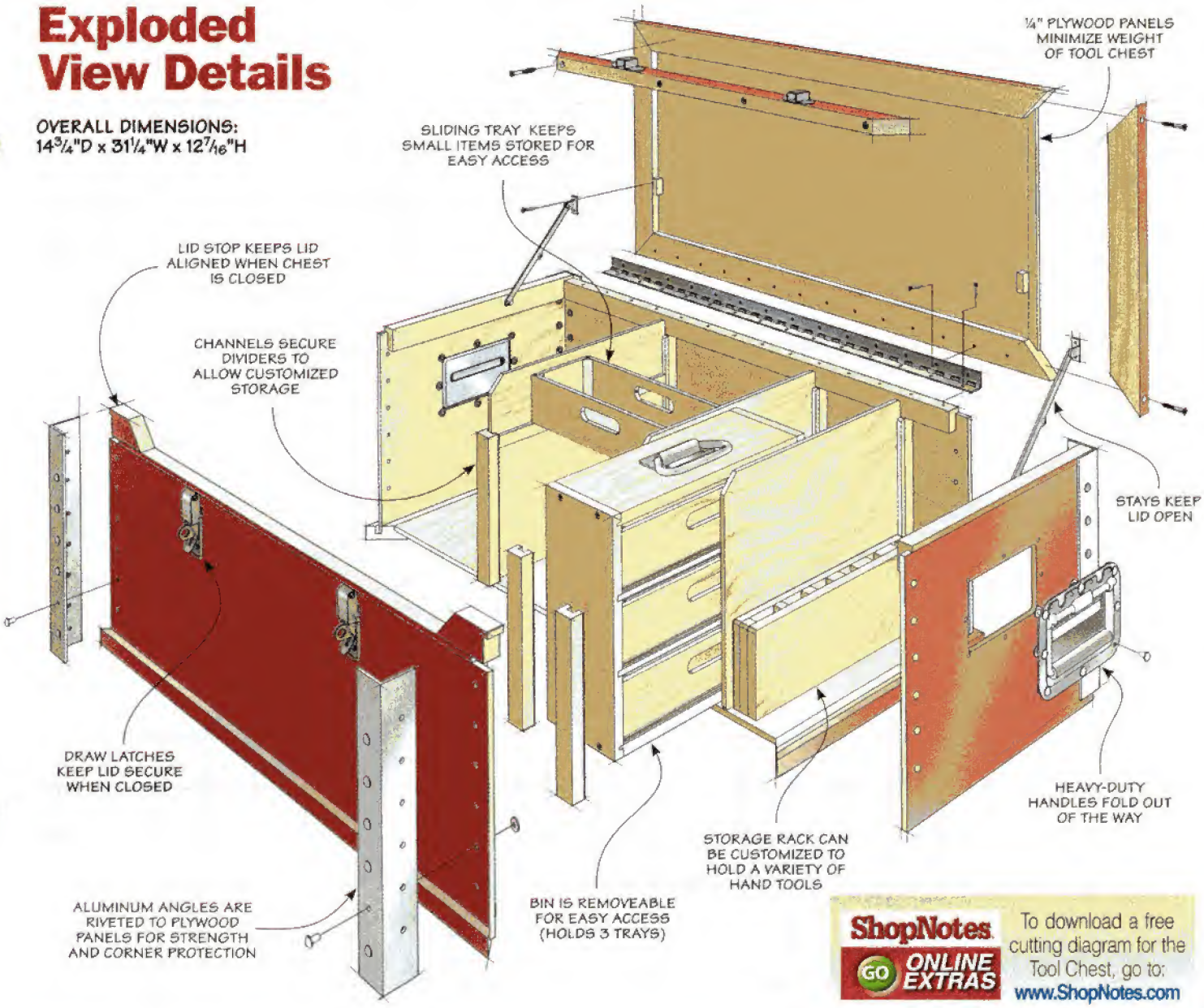
This heavy-duty tool chest has lots of handy storage and great organization — with an easy-to-build, lightweight design.

It seems like every tool chest I've ever had was too heavy to move around once it was loaded up with tools. Well, that's not the case any more. With just a little "high-tech" aluminum riveted to some ¼" plywood, I was able to build a lightweight chest that was portable and heavy-duty.

Then, to keep everything organized, I added removeable dividers, a sliding tray, and a pull-out bin. There's even a small rack inside to provide quick access to often-used tools. And you can arrange these accessories any way you want to suit your needs. You'll find all the details for this on page 22.

Exploded View Details

OVERALL DIMENSIONS:
14¾"D x 31¼"W x 12⁷⁄₁₆"H



ShopNotes GO ONLINE EXTRAS

To download a free cutting diagram for the Tool Chest, go to: www.ShopNotes.com

Materials & Hardware

A	Front	9⅞ x 30½ - ¼ Ply.
B	Back	10¹⁵⁄₁₆ x 30½ - ¼ Ply.
C	Sides (2)	11⅛ x 13½ - ¼ Ply.
D	Aluminum Corners (4)	⅛ x 1½ x 1½ - 10¹⁵⁄₁₆
E	Lid/Bottom (2)	12½ x 29 - ¼ Ply.
F	Front/Back Rail (4)	¾ x 1⅝ - 31¼
G	Side Rails (4)	¾ x 1⅝ - 14¾
H	Front Cap	¾ x 2 - 28½
I	Lid Stops (2)	¾ x 1¼ - 3¼
J	Back Cap	¾ x 1¹⁄₁₆ - 29
K	Side Cap	¾ x 1¼ - 13¼
L	Lid Lip	¾ x 1¼ - 26⁷⁄₁₆
M	Stay Supports (2)	½ x ½ - 1⅝
N	Dividers (3)	12½ x 10½ - ¼ Ply.
O	Front Divider Channels (3)	¾ x 1 - 7¹¹⁄₁₆
P	Rear Divider Channels (3)	¾ x 1 - 9¹¹⁄₁₆
Q	Rack Front/Back (2)	½ x 4¾ - 11¾
R	Rack Spacers	Cut to Fit
S	Tray Runners (2)	¼ x ¾ - 12
T	Tray Fronts/Backs (8)	¼ x 2½ - 11
U	Tray Sides (8)	¼ x 2½ - 3¾
V	Tray Bottoms (4)	10¾ x 3¾ - ⅛ Hdbd.
W	Tray Corner Supports (12)	⅜ x ⅜ - 2¼
X	Bin Top/Bottom (2)	½ x 4½ - 11¾
Y	Bin Sides (2)	½ x 4½ - 10½
Z	Bin Shelves (2)	¼ x 4½ - 11¾
AA	Bin Shelf Lips (6)	11¼ x ¼ - ⅛ Hdbd.

- (64) 3⁄16" x 5⁄8" Universal Head Rivets
- (64) #8 Flat Washers
- (2) Recessed Pull Handles
- (1) Pull Handle
- (2) Draw Latches
- (2) Lid Stays
- (1) 1½" x 27¾" Piano Hinge
- (8) #8 x 1¼" Fh Woodscrews
- (4) #8 x 1¾" Fh Woodscrews

▲ ***Light & Strong.*** *Riveting sections of aluminum angle into the corners make this one sturdy tool chest.*

riveting the Case

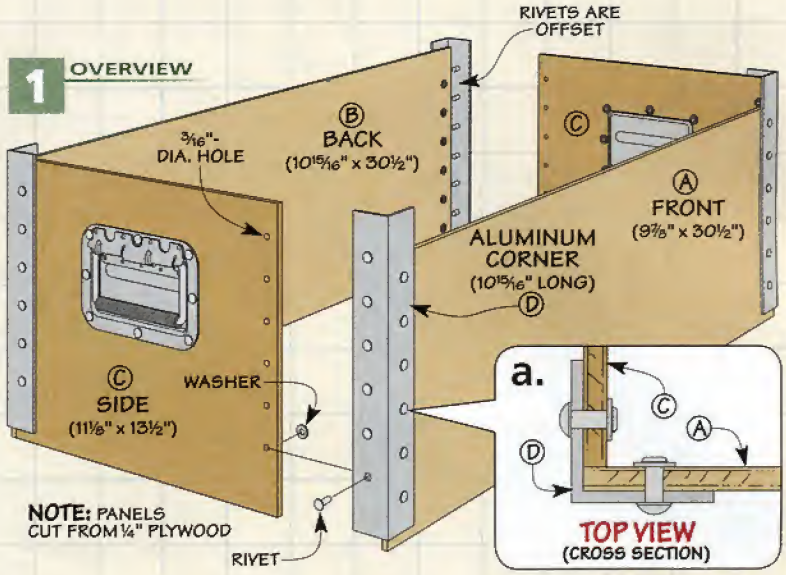
The tool chest starts out as four ¼" plywood panels joined at the corners with aluminum angles, as you can see in Figure 1. The thin panels minimize weight, while the corners add strength to the case. Later, the lid and bottom will be added to complete the chest.

The Panels. As you get ready to size the panels, you'll notice the two sides are identical, but the front and back are different widths. The front panel is a bit narrower than the back to accommodate a "lip" that will help align the lid to the case.

After cutting the panels to size, now is a good time to cut the openings for the handles (Figure 3). To do this, drill a hole in each corner and then use a jig saw to remove the waste. The handles will be riveted to the sides later.

The Joinery. The panels are simply butted together, as in Figure 1a. Instead of gluing the panels together with weak butt joints, the corners will be reinforced with aluminum angle and rivets. The opposite page covers everything you need to know to do this. I'll just point out a couple of details here.

1 OVERVIEW

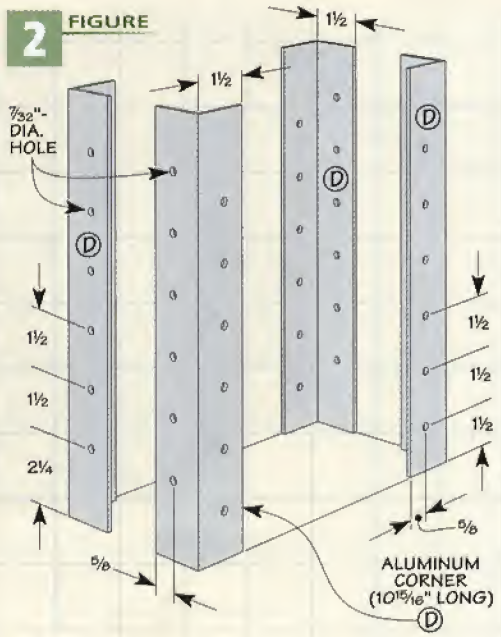


Drill Guide. Once the rivet holes are drilled in the corners (Figure 2 shows the hole locations), you can use them as guides to mark the holes in the panels. Be sure to keep track of which angle you use for each corner, so the holes align when the rivets are installed.

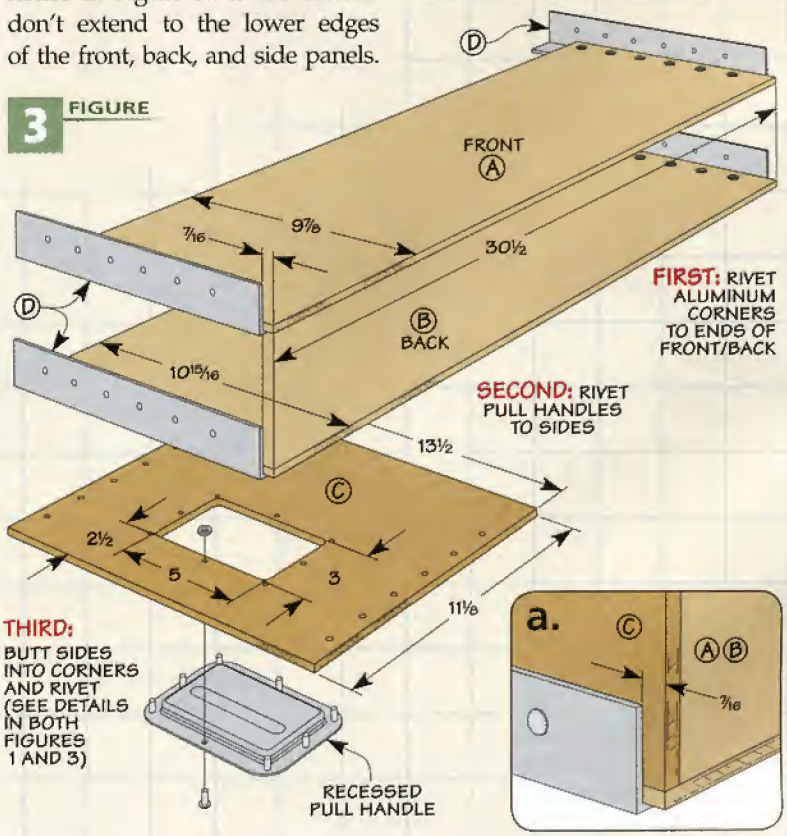
I attached the aluminum corners to the front and back panels first. This leaves plenty of clearance to hammer the rivets later when you attach the sides. One thing you'll notice in Figure 3a is the corners don't extend to the lower edges of the front, back, and side panels. These edges are exposed to fit into a groove cut into the bottom of the chest that you'll build later.

Complete the Case. Before attaching the sides to the corners, you'll want to go ahead and install the handles in the openings you cut earlier. This is just a matter of following the same procedures you used to install the corners. With the panels and corners done, you can now turn your attention to the bottom and the lid.

2 FIGURE



3 FIGURE



Making Riveted Joints

Perfect Rivets. *A hardwood block (maple) acts as an "anvil" while you set the rivets with a hammer and riveting tool.*

Using aluminum angle for the corners is the perfect solution to add strength to the tool chest. And installing the rivets to do this is easy using the simple step-by-step process in the photos below. But there are couple things I'd like to mention first.

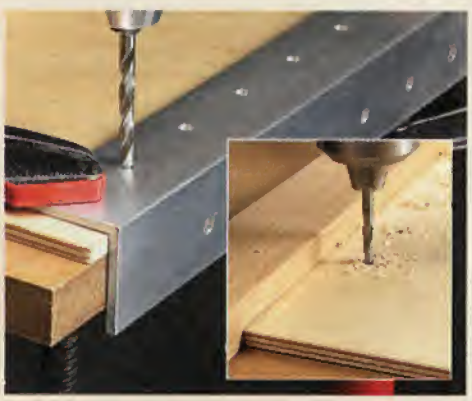
Offset Holes. First, you'll notice the two sets of holes in each angle are offset (photos at right). This makes it easier to install the rivets, because they won't interfere with each other in the corners.

Second, the holes drilled in the aluminum are 1/32" larger than the diameter of the rivets, while the holes in the plywood are an exact fit. This ensures the rivets slip through both parts without any problem during installation in case the mating holes in each piece are little off. The tight fit in the plywood (along with some tape on the corners) will secure the rivets as they're hammered in place. And don't worry, the rivets form a tight fit in the aluminum as they flatten.

Finally, when you install the rivets, make sure you have a solid "anvil" to absorb the hammering. I used a hard maple board that extended to the floor and clamped it in my bench vise (above photo).

▲ ***Square Up Corners.*** *To true up aluminum angle, tap the corner to spread the angle, or squeeze it in a vise if the angle is too wide.*

▲ ***Drill the Holes.*** *Using a hardwood backer board for support, carefully drill the holes in each corner. Use a countersink to clean up the holes.*



▲ ***Mark Holes.*** *Use the corners to mark holes in the panels, then change to a smaller bit to drill the holes.*

▲ ***Install Rivets.*** *Tape rivets to hold them in the angles. A riveting tool "mushrooms" them for a secure connection.*

▲ ***Install Side Panels.*** *After riveting the corners to the front and back panels follow the same procedure for the sides.*

completing the Case

With the front, back, and sides joined together, you're ready to complete the assembly of the chest. The first step here is adding the bottom (Figure 4). Not only does it square the case, it adds a lot of rigidity. Once that's done, all you'll need to do is add a few pieces of trim and then the lid.

Making the Frames. The bottom is a frame and panel assembly. And because the base fits into the frame, that's where I started. After ripping the frame parts to width, I cut them to rough length. Next is a trip to the table saw to cut a rabbet in the frame pieces for the bottom panel (Figure 4b). A dado blade makes quick work of this task.

Add a Groove. Once the rabbets are cut, you can cut the groove that the case panels will sit in (Figure 4b). What you're looking for here is to size the groove to match the thickness of the case panels.

Miter the Frame. With that done, cut the bottom panel to size and miter the frame parts around it. Then, glue the panel in the rabbets, and clamp the assembly.

Add the Case. Once the glued has dried, you can attach the frame to the case. Simply run a bead of glue in each groove and ease the case in place. A few light taps with a rubber mallet will seat the case firmly in the groove. At this point, you're ready to work on the top edges of the case.

Trim It Out. As I mentioned earlier, the top edges of the case panels aren't flush with the aluminum corners. To flush them out and cover the edges of the plywood panels, you'll need to add some hardwood caps. The caps also add a little extra rigidity to the top of the case.

I started with the front cap (Figure 5). It's not as long as the back cap to avoid the rivets attaching the front panel to the corners, as in Figure 5b. And rabbeting one face allows the cap to wrap around the case panel.

To "finish out" the front edge, you'll need to add a pair of lid stops (Figure 5b). The stops "extend" the front cap over the side panels without interfering with the corner rivets. And I mitered the inside ends of the stops to match the lip that will be added to the lid later. (Cutting the lip and stops from

FIGURE 4

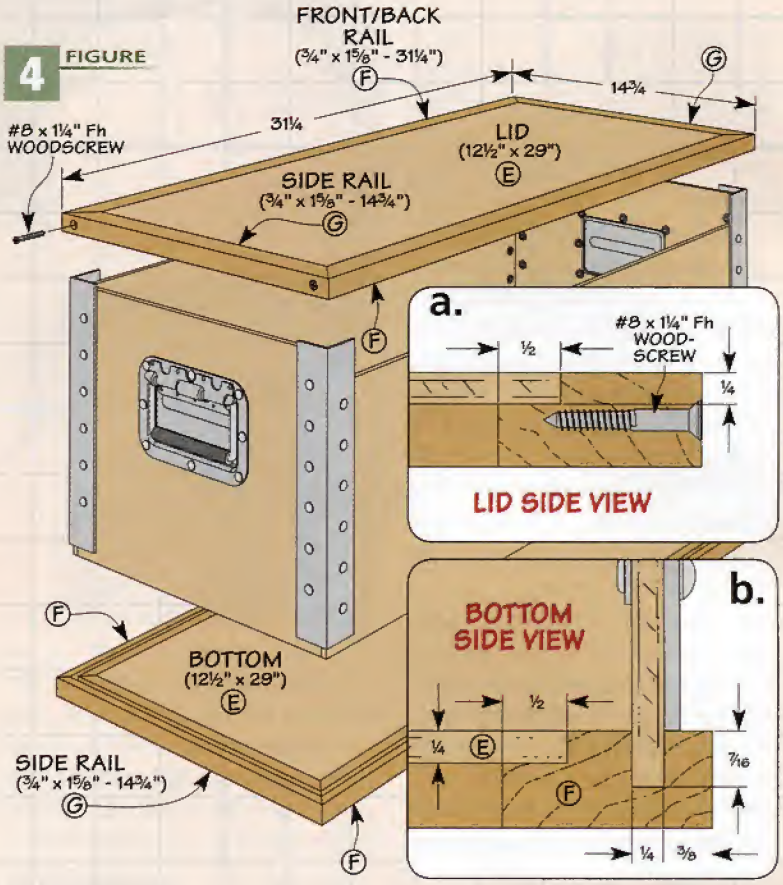
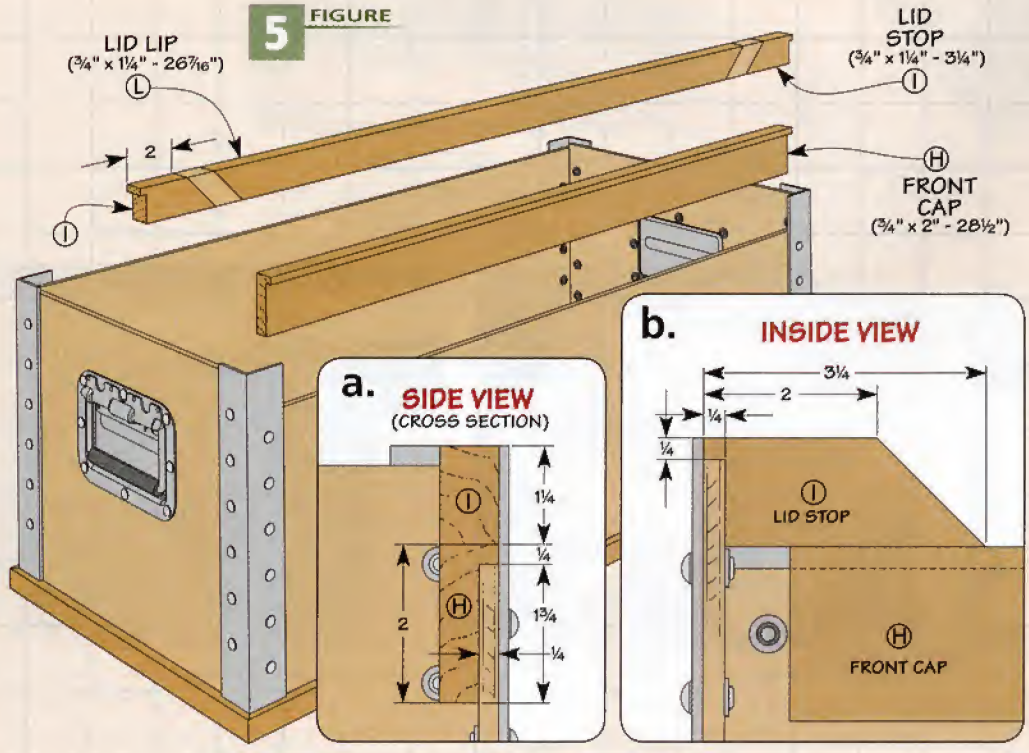


FIGURE 5



the same workpiece help ensure they'll fit back together later.)

Once the front cap and stops are in place, you can turn to the side caps. Their front ends butt up against the lid stops, while the rear is notched to fit over the back panel, as in Figures 6 and 6a.

Finally, you can install the back cap between the side caps. To accommodate the piano hinge that will attach the lid to the chest, the back cap sits slightly lower than the side caps, as seen in Figure 6b.

Adding the Lid. With the case and bottom complete, you can focus your attention on the lid. The assembly process is similar to the bottom. You'll follow the same process, with two exceptions — the lid frame has no groove and the corners are screwed together. I did this to add strength.

Before you attach the lid to the case, there are a couple of things left to do. First, attach the lip you cut earlier to the lid, like you see illustrated in Figure 7. When the lid is closed, the lip should nestle snugly between the stops to keep the lid aligned with the case.

The lip also serves as a mounting surface for the draw latch catches (Figure 7a). You'll also need to add small stay supports to the lid to position the lid stays properly.

Finishing Touches. To complete the basic chest, all that's left to do is install the piano hinge, like you see in Figure 7b. Adding a couple of coats of paint will make this tool chest stand out at any job site.

At this point, you could use the chest just the way it is. It already provides plenty of storage. But to better organize the inside of the chest and make finding tools and hardware a snap, turn the page.

FIGURE 6

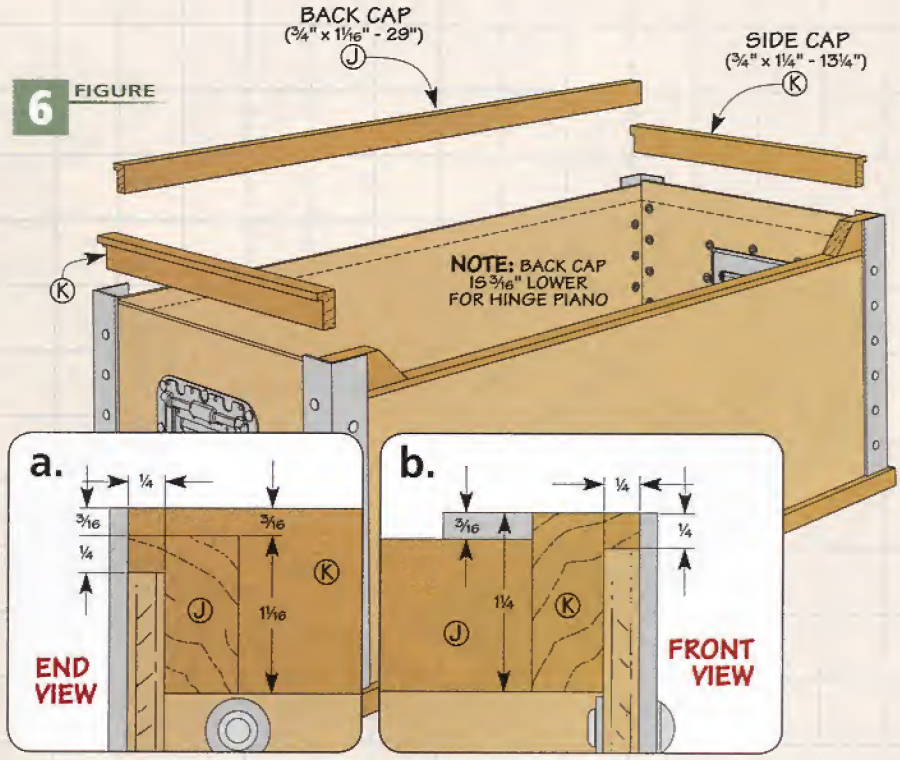
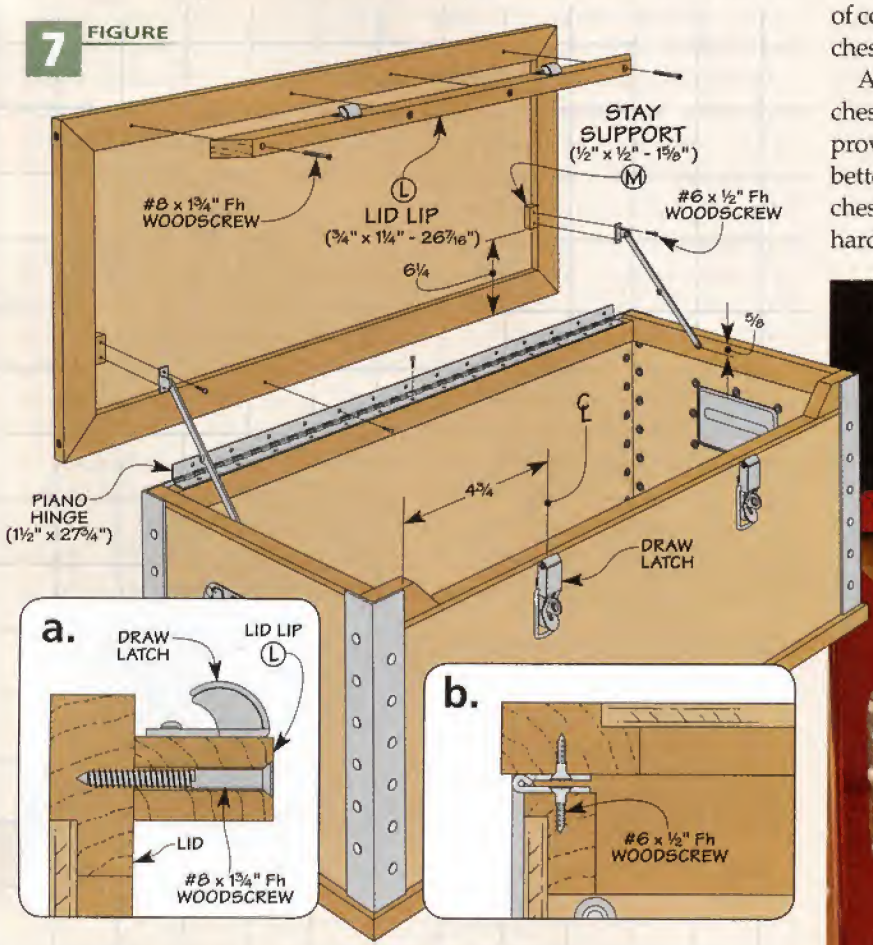


FIGURE 7



▼ ***Keeping the Lid Aligned.*** *The angles in the lip and the stops work together to keep the lid square to the case when the chest is closed.*

tool chest

Accessories

▲ ***Under the Lid.*** *Storage accessories add organization and versatility to the tool chest.*

By itself, the tool chest provides a lot of great storage for tools, hardware, and accessories. But things can get lost and rattle around in a wide-open box. So to keep things easy to find, I built a few, simple organizers.

For starters, you can add vertical dividers to break up the space. Then, there's a rack for hand tools (inset photo). You can also add a sliding tray, and finally, a removeable bin to take your tools and hardware "on the go."

Dividers. The first step in organizing the chest is to add dividers and a set of channels to position them. As you can see in Figures 8 and 8a, I added three dividers to the chest. You can place them anywhere in the chest you'd like, but I spaced the dividers to allow for the other accessories.

The key to determining the spacing for the dividers is to decide what accessories you want in the chest before you install them. For example, if you add the sliding tray to the chest, you'll need to position the dividers to support it. The same goes for the pull-out bin.

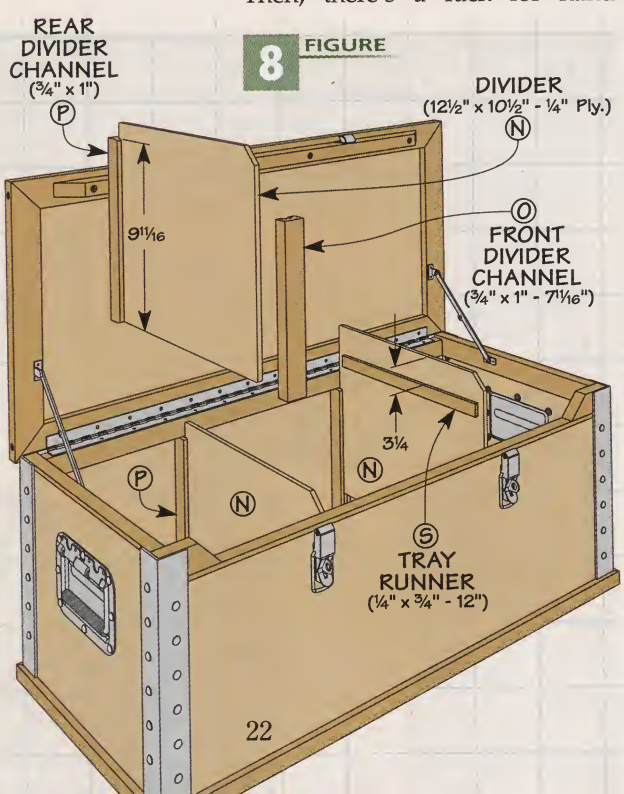
▲ ***Hand Tool Rack.*** *This handy rack can be customized to fit a variety of small hand tools.*

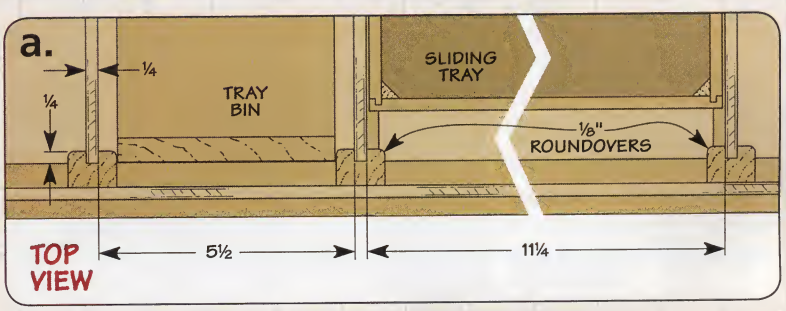
It fits between the channels that hold the dividers in place, as you can see in Figure 8a.

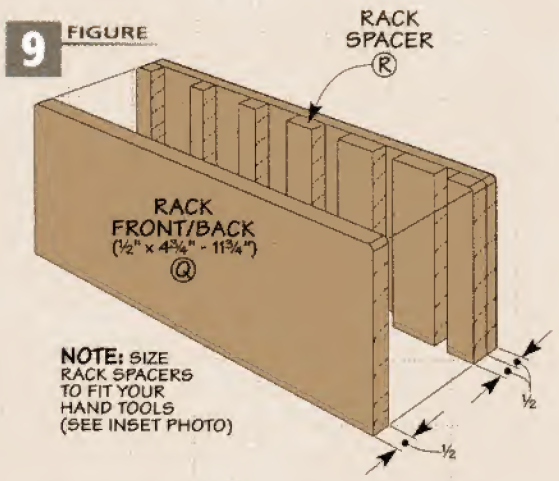
Once you've decided on the arrangement of the accessories, you'll need to make a pair of channels to hold each divider. They're just hardwood strips with a centered groove. They fit under the caps and are glued in place.

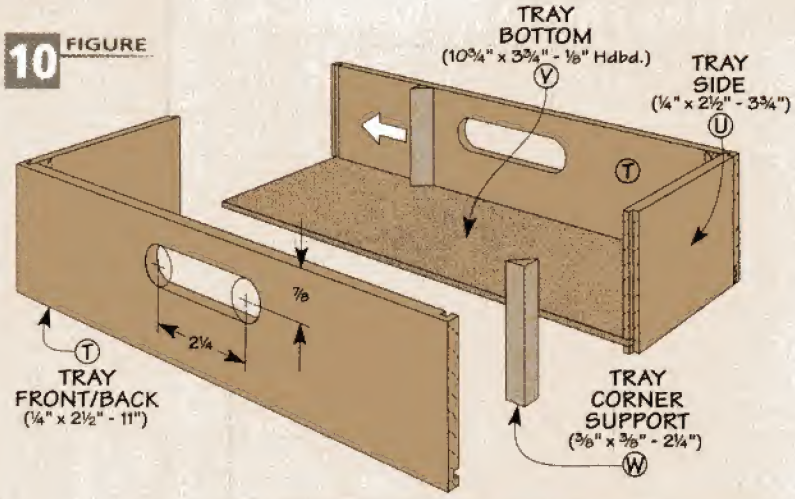
The dividers slide into these channels (Figure 8a). The dividers

FIGURE 8









are not glued in so you can remove them if you need to store large items in the tool chest.

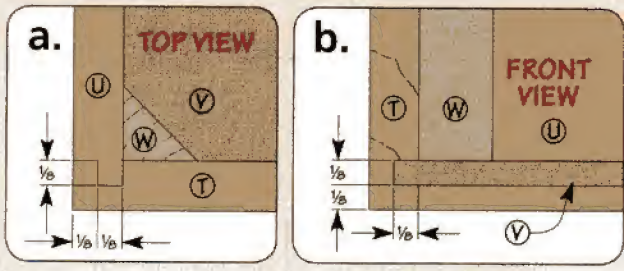
Tool Rack. A handy accessory for the chest is a small tool rack (inset photo). Putting it together is easy. As Figure 9 shows, The rack consists of a set of spacers sandwiched between two small panels. I built mine to hold a set of chisels, but by varying the widths and thickness of the spacers, you can store screwdrivers, wrenches, pliers, and even measuring tools, like a combination square.

Tray. Another storage option for the chest is the sliding tray in Figure 10. It's nothing more than a rectangular box with a hardboard bottom and cutouts for handles.

There are a couple of things to mention about building the tray. To create a strong, sturdy box, I used tongue and dado joinery. And to add even more strength to the tray, I glued support blocks in the corners (Figure 10a). The tray bottom fits in grooves cut into the tray's sides, front, and back, as you can see in Figure 10b.

Once the tray is assembled, it will rest on runners attached to two of the dividers (Figure 8). This way, the tray can be slid back and forth in the chest as needed.

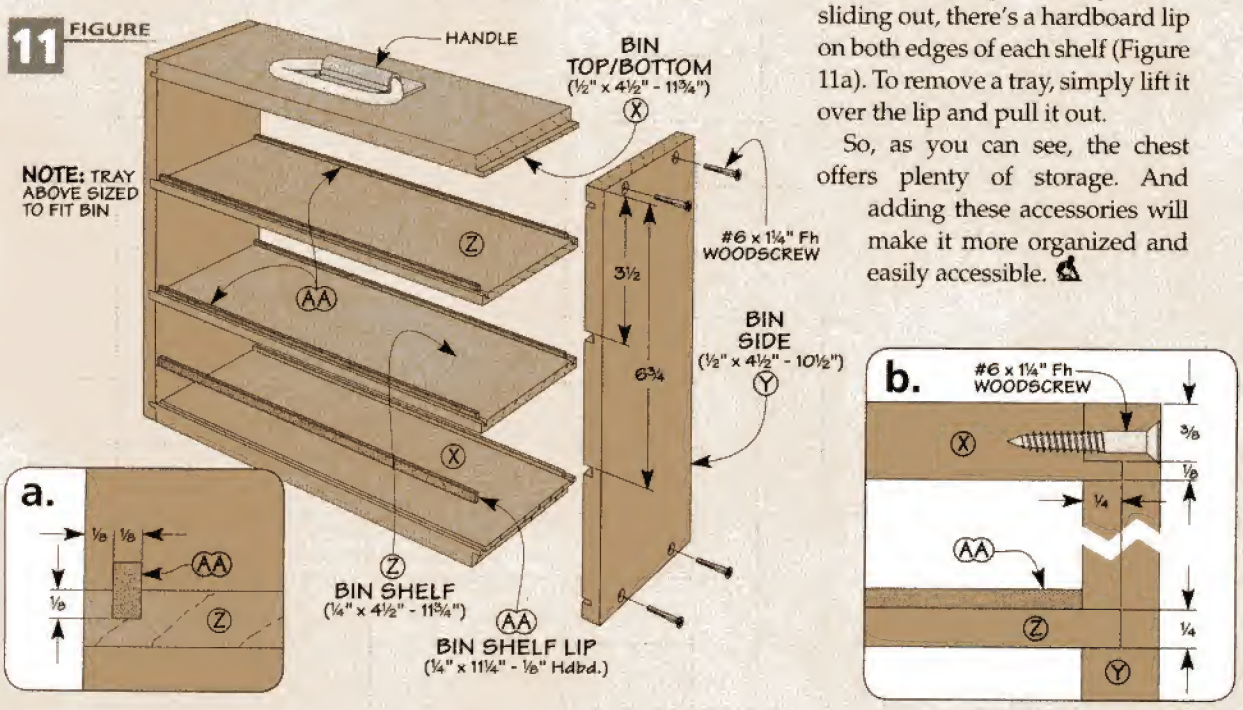
Pull-Out Bin. Now, you may want to build several of the trays just described. Why? Because the pull-out bin in Figure 11 can hold up to three additional trays.



Since those trays can hold a lot of tools and hardware, the bin is built a little beefier than the other accessories. The top, bottom, and sides are cut from ½"-thick stock. The tongue and dado joinery is reinforced with screws (Figure 11b). But to keep the bin lightweight, the two shelves are ¼" thick and fit into dadoes.

And, to keep the trays from sliding out, there's a hardboard lip on both edges of each shelf (Figure 11a). To remove a tray, simply lift it over the lip and pull it out.

So, as you can see, the chest offers plenty of storage. And adding these accessories will make it more organized and easily accessible.



Shop Short Cuts

Finger grips will save your thumbs and keep the mallet head from spinning as it's shaped.

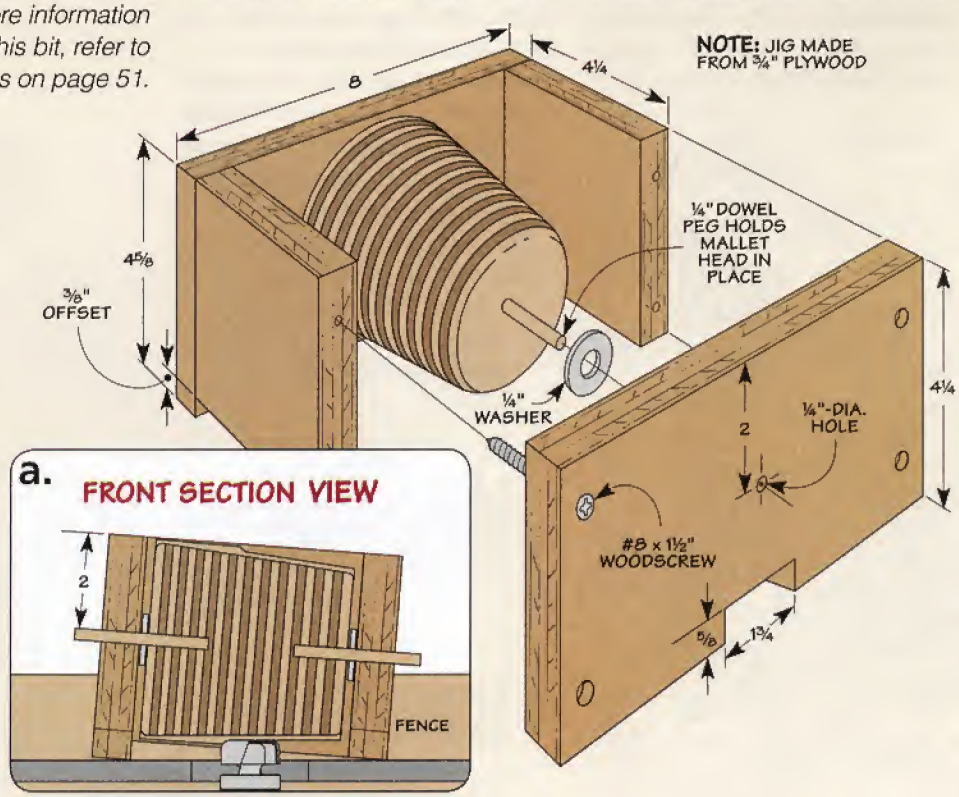
▲ ***Bowl Bit.*** *A bowl and tray bit will leave a smooth finish on the mallet head. For more information on this bit, refer to Sources on page 51.*

Shaping the Mallet Head

At first glance, the mallet head on page 26 looks like it was turned using a lathe. But you can do all the shaping on the router table, using a bowl bit (margin photo) and a shop-made jig, as shown in the photo above.

Build the Jig. In the drawing below, you can see the jig is just a simple box. It allows you to guide the mallet head safely over the router bit. One side of the jig is slightly taller than the other, raising one end. This tilts the blank so that as the jig and blank pass over the bit, the mallet head is tapered.

The mallet head is held in place with two short pieces of dowel rod. You'll want to put washers at each end between the mallet head and jig to create a snug fit and keep the head from binding as you turn it.



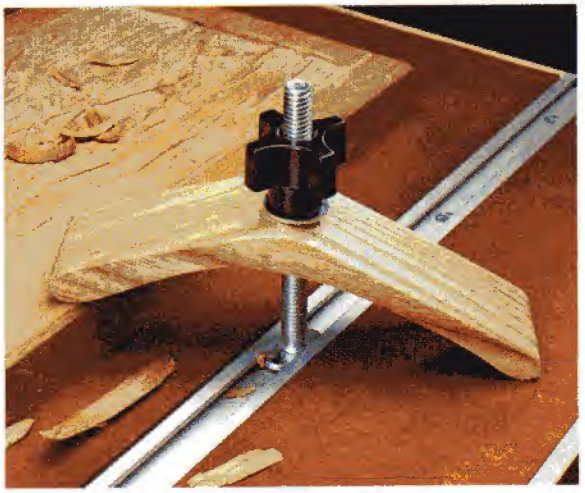
Set Up. To use the jig, position the fence until the centerline of the jig is aligned with the centerline of the bit. As you can see in the photo above, an auxiliary fence clamped to the front of the table keeps the jig sliding straight and smooth on the router table.

The last thing to do before shaping the head is to set the bit height. Start with a shallow cut and work up to a higher setting. A 4"-dia. circle drawn on the "large" end of the jig will let you know when you're done.

"Turning" the Taper. With the jig away from the bit, turn on the router. Then slowly slide the jig across the bit, keeping the blank steady as you go.

After the first pass you can rotate the blank slightly and make another pass across the bit. You'll repeat this step as you make your way around the blank. Then raise the bit slightly and repeat the process. Your goal here is to end up with an even, cone shape, like you see in the main photo. Once it's shaped, you can sand it smooth.

Shop-Made Hold-Down



A shop-made hold-down is a great way to keep your work firmly in place. And that makes it a great addition to the multi-purpose table on page 36.

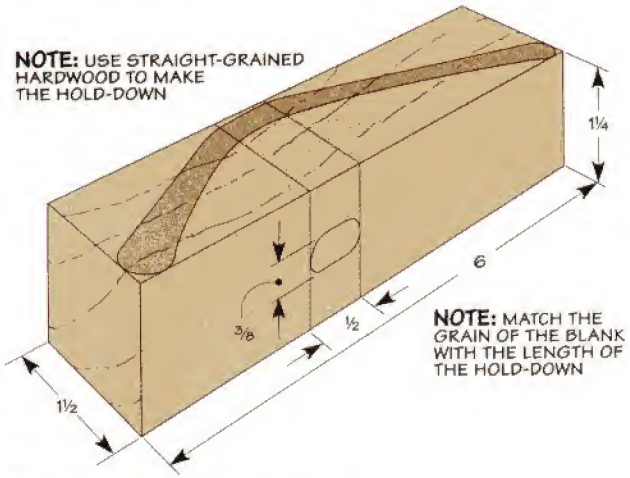
Curved Design. As you can see in the photo at right, one end of the hold-down rests on the tabletop, while the other end presses against the workpiece. The clamping pressure is produced by tightening a knob and washer on the end of a flange bolt, which rides in the T-track.

Choose the Wood. To make this clamp, you'll want to use hardwood stock. (Any type will do.) What's more important is that you're careful to align the grain with the length of the clamp. This way, you don't have to worry about the clamp cracking when you apply pressure from the bolt.

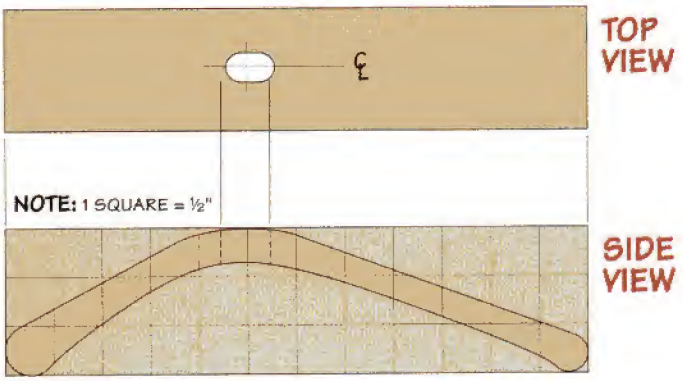
Transfer the Pattern. To make the hold-down, transfer the pattern from the drawing below to the side of your blank. You can either enlarge the pattern on a copy machine and attach it to the blank or lay out the pattern by hand using the grid marks.

Make the Slot. It's a good idea to drill the holes for the slot before shaping the hold-down. The slot accepts the flange bolt and is located at the highest point in the curve of the pattern. To make the slot, I drilled a series of holes on the drill press and then cleaned up the slot with a chisel and file.

Shaping. All that's left to do is cut out the hold-down on the band saw and sand it smooth.



Hold-Down Pattern



Spraying on a Leather Dye

Leather makes a perfect surface for the top of the multi-purpose table on page 36. The only problem is unfinished leather looks pale and bland. But you can give it an aged look by applying a leather dye.

Clean. The tanning process leaves oils on the leather, so the first step is to clean it so the dye will penetrate evenly. I've found that denatured alcohol does the job nicely and dries quickly.

Stain. Next, mix a little dye with denatured alcohol in a spray bottle until you get a color you like. Then spray the leather evenly. If you overspray an area, you can just wipe it off with a soft cloth.

Protect. After the dye has dried, put on a topcoat to protect the leather. I used *Tan-Kote* from *Fiebing's*, but mink oil or neutral shoe polish will work, too.

For information on where to purchase *Fiebing's* products, refer to Sources on page 51.

weekend workshop

shop-built Mallets

These mallets are designed to last a lifetime. But the best part is, you can build them in a weekend.

There's a certain satisfaction that comes from building a practical, quality tool and using it in the shop. So when I saw these mallets that Chris (our designer) made, I knew they'd be a big hit.

The cabinetmaker's mallet on the left is great tool for all-around shop use. It's shape and heft come in handy during project construction and assembly. And the rounded carver's mallet (shown on the right) provides just the right control for chisel work and carving.

Both of the mallets you see above share the same laminated design for the head. I used alternating layers of *Lyptus* and maple, but you could use any contrasting hardwoods you have available. The layered construction makes them easy to build and durable enough for a lifetime of use.

One of the keys to creating a hand tool you'll really use is making it comfortable to hold. So shaping the handles is critical. The nice thing is, it's easy to do with a simple technique and a shop-made jig for your router table. Besides being a great way to custom-fit them to your hands, it guarantees that it won't take long to appreciate the usefulness of these mallets.

laminating a Blank

The strength of these mallets comes from the laminated hardwood construction. In the photos and drawings on this page, you'll see the basics of creating the laminations and gluing up a blank for the carver's mallet. The process for the cabinetmaker's mallet is nearly identical, as you'll see later.

Layout the Cuts. The first step in making the carver's mallet is resawing some stock on the band saw to create the laminations. To do this, you'll need to establish guide lines on the edge of your stock. The goal is to end up with 3/16"-thick strips, so I marked layout lines roughly 1/4" apart.

Resaw. Now it's time to set up your band saw for resawing. A simple, shop-made pivot block makes it a snap to keep the blade cutting right on the layout line, as shown in the photo above.

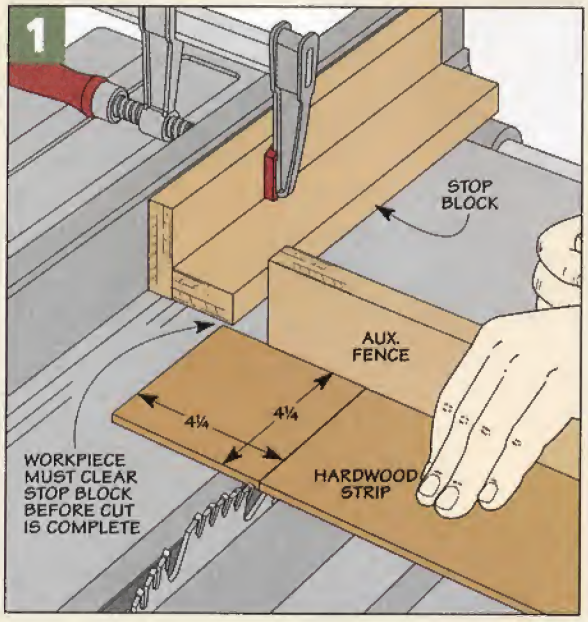
Plane to Thickness. Once you have the strips cut, you can plane them to final thickness. Planing thin stock can be a challenge. To make this process easy and safe, I like to plane the strips by fastening them to a "sled" of 3/4"-thick melamine, like you see in the photo at right. With the strips planed smooth, you're ready to glue up the blank for the head of the carver's mallet.

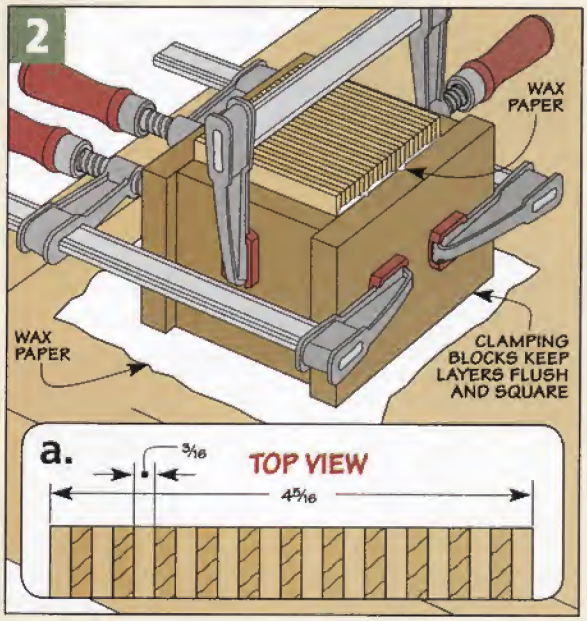
▲ ***Resawing.*** *A simple pivot block helps you keep the blade cutting on the layout line.*

▲ ***Planing Sled.*** *Each strip is fastened to a sled with double-sided tape for planing.*

Sizing the Laminations. When it comes to gluing up the head of the carver's mallet, I learned that creating a blank with square, smooth edges makes things a lot easier later. So you'll want to take care as you first rip the strips to width and then cut them square (Figure 1).

Gluing up the Blank. Now you're ready to glue up the blank. What's important here is to alternate grain direction of each layer as you assemble the blank. As you can see in Figure 2, wax paper and clamping blocks keep the sides flush. Finally, let the glue dry overnight then turn the page to start shaping the head.





carver's
Mallet

Controlled Taps. *The round head on the carver's mallet means more control over your cuts for carving and chisel work.*

Once have the blank glued up for the head, you're ready to work on shaping it. Then, you'll drill the hole (the "eye") for the handle.

You might wonder how the tapered head is shaped. If you have a lathe, it's pretty straightforward. But if you don't own a lathe, don't worry. The secret is a simple jig for your router table, shown in Shop Short Cuts on page 24.

Mark Centers. To get started on shaping the head, the first step is to mark a centerpoint on both ends. I did this by drawing diagonal lines from each corner. Then, using a compass, I marked a 4"-dia. circle on the blank. This will be the finished diameter of the large end of the mallet head.

Rough Shaping. To make routing the head to its final shape a little easier, I tilted the blade of the table saw to 45° and cut off the corners of the blank. Figure 3 shows the blank after making these cuts.

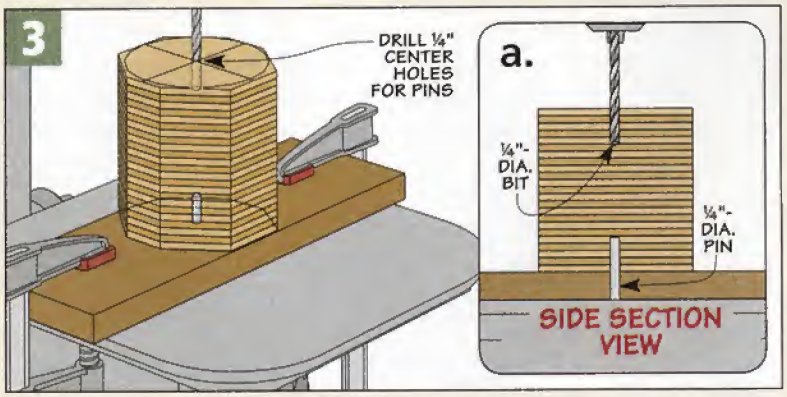
Center Holes. You'll also need to drill a centered hole in each end. These holes will be used later to shape the head. It's important for these holes to align. So after drilling one hole, I attached a scrap to my drill press table and drilled an alignment hole using the same bit. After slipping a pin in place, simply set the blank over it and drill the other hole, as in Figure 3.

Router Sled. Now you can shape the blank using a simple router jig. It's nothing more than a plywood sled that holds the blank at a slight angle as you "turn" the blank to shape. (All the details for building and using it are on page 24.)

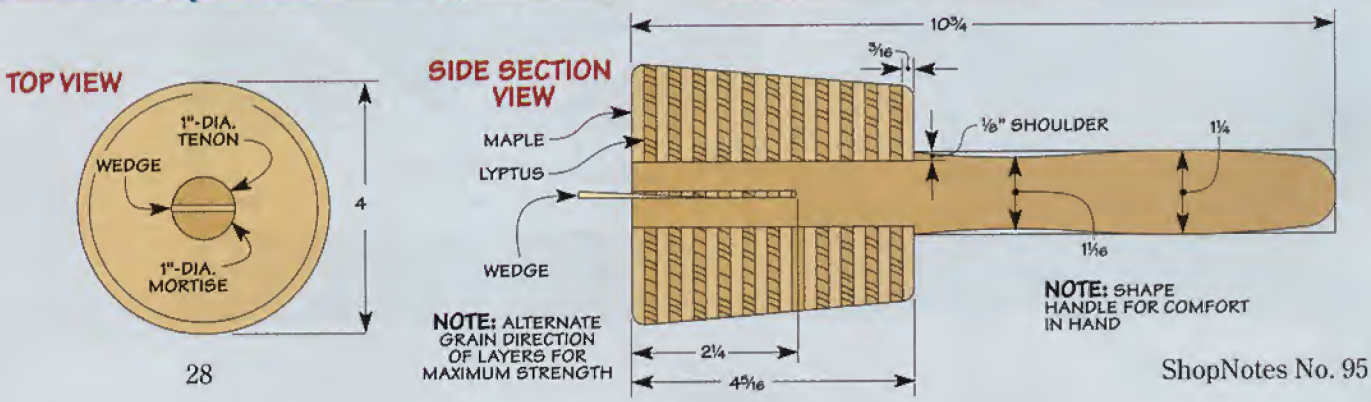
With the blank sanded smooth, you can round over the ends at the router table with a ¼"-radius roundover bit. Then, all that remains to complete the head is to drill the hole for the handle.

Drilling Jig. The handle requires a 1"-dia. hole all the way through the blank. But I didn't have a drill bit that was long enough. So I built the drilling guide you see in Figure 4. It helps keep the drill bit aligned and square to the blank as you drill through from each end.

To use the jig, place the mallet blank tight into the corner of the jig. Use a ¼"-dia. drill bit chucked in the drill press to locate the jig and blank, then clamp the jig in place. Now you can switch to a 1"-dia. Forstner bit and drill as deep as you can, going slow and clearing the chips as you go. Then flip



Mallet Specs



the blank over, making sure it's tight into the corner of the jig and drill through to complete the hole.

ADDING THE HANDLE

Now you can set the mallet head aside and turn your attention to making the handle. I used both the band saw and another router table jig to shape the handle.

I started out with a blank about 5" longer than the finished handle. This allowed me to keep each end square while shaping the handle.

Start with the Tenon. The first step is to narrow a portion of the blank using a dado blade, as you can see in the margin drawing. This part will become the round tenon that fits into the head.

Once that's complete, you can head over to the band saw and rough out the basic shape of the handle using the pattern you see on the opposite page.

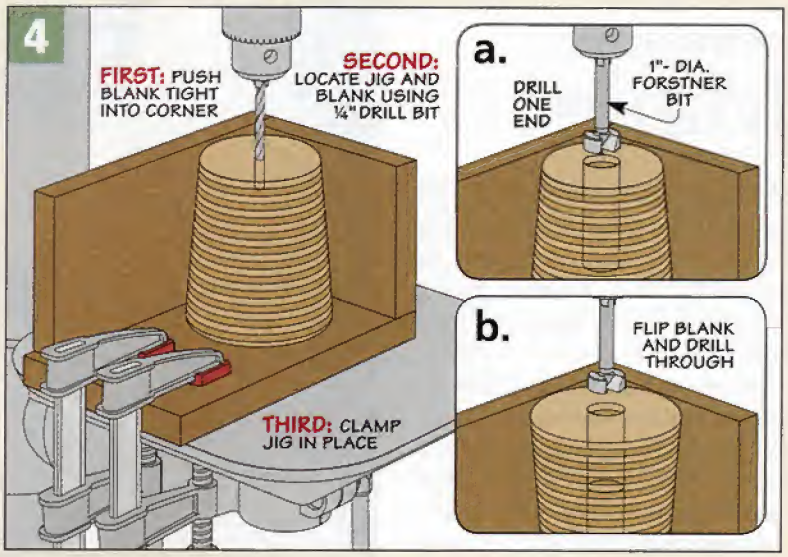
The next step is to make the tenon round. To do this, I built the "turning jig" in Figure 5. It holds the ends of the handle blank so you can rotate it over a straight bit in the router table. You'll want to sneak up on the size. (I used calipers to check my progress.)

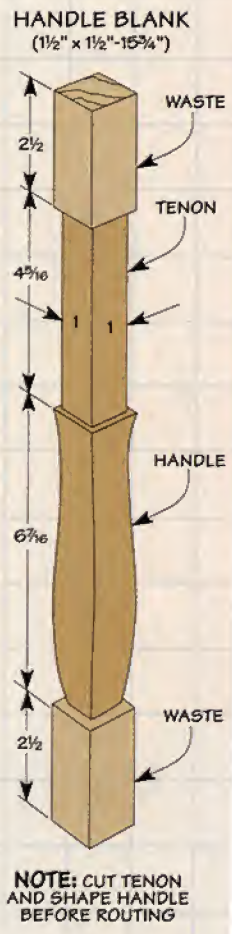
Now you're ready to round over the edges of the handle. The problem here is the handle is a complex curve, so you can't really rout a roundover using the flat surface of a router table as a reference. So I made a "bridge" to help out with this task (Figure 6). It acts as a pivot point to position the handle properly against the bit's bearing for effective routing.

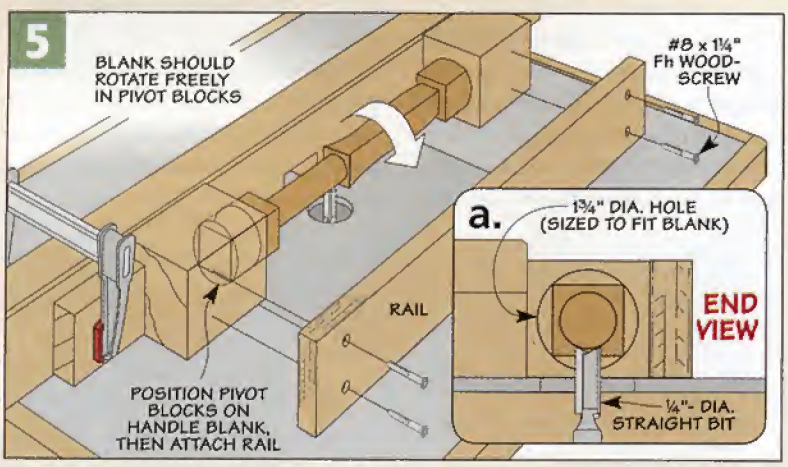
Final Shaping. The next thing to do is cut off the square ends and smooth the handle using a rasp and sandpaper. Take your time here to get it fit just right for your hand.

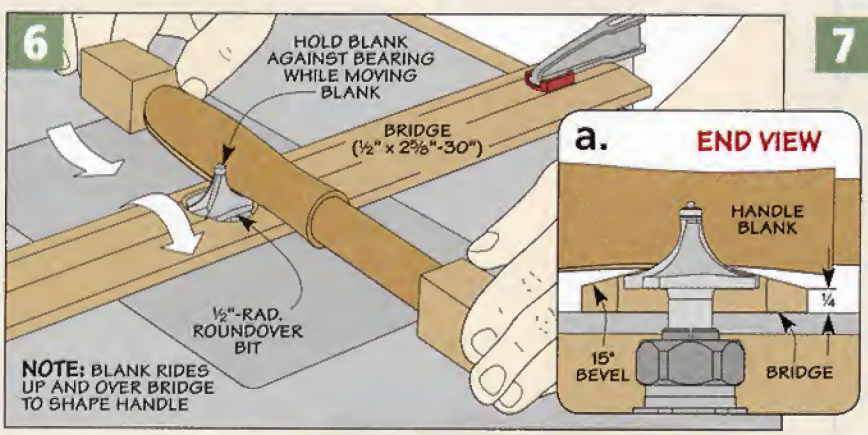
Glue and Wedge. Now you're about ready to glue and wedge the handle in place. First, I used my band saw to cut a slot in the round tenon for a wedge. While I was at it, I cut the wedge to shape.

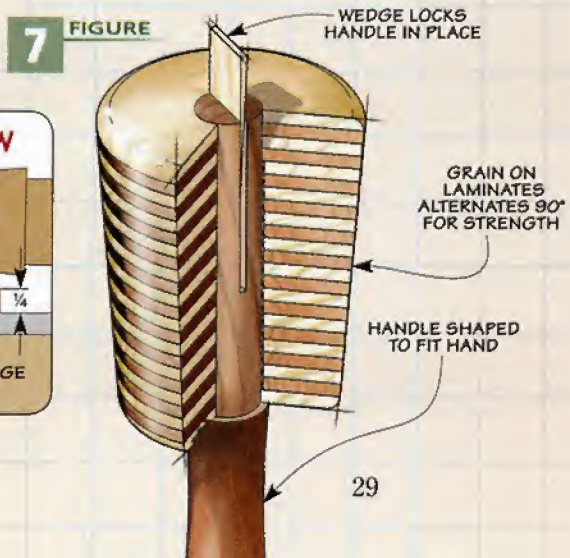
After checking the fit of the handle, apply a thin layer of glue and tap the handle tight against the head. Finally, add a little glue to the wedge and tap it in place. After trimming the wedge and tenon flush to the head, sand everything smooth.











cabinetmaker's Mallet

Solid Force. *The broad, smooth face of this mallet knocks joints together without marring the surface.*

A cabinetmaker's mallet, like the one you see in the photo, gets a lot of use in my shop. It's handy for knocking joints together during assembly — and knocking them apart after a dry fit.

Planning the Glue-Up. The head on this mallet is laminated, like the carver's mallet. But instead of gluing up all the layers at once, you'll be doing it in steps. This makes it easier to create the "eye," or opening for the handle. And there's one other difference here. I added some steel weights to give the mallet extra heft. They're just short sections of steel rod glued in place.

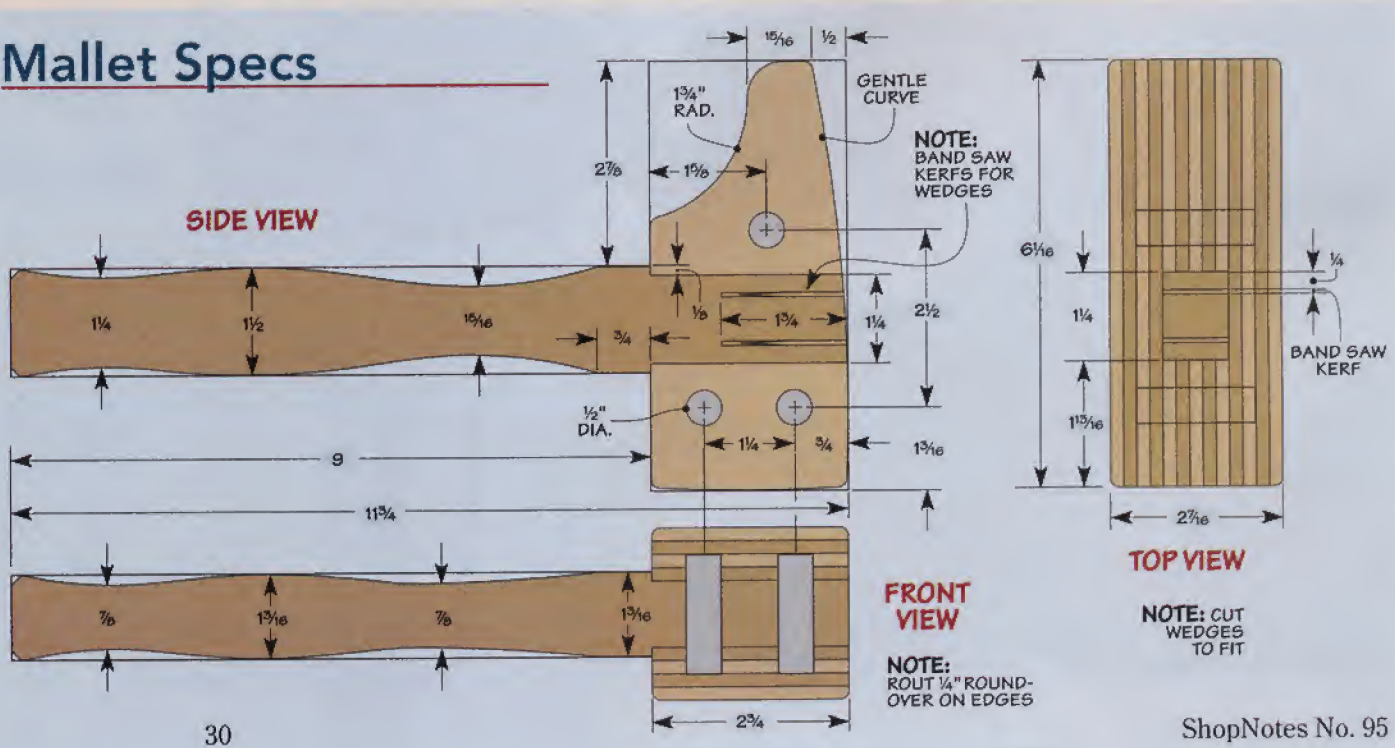
Rectangular Blank. I started off by gluing up nine layers of the 3/16"-thick rectangular strips. Note: Unlike the carver's mallet, the grain on all the strips of the cabinetmaker's mallet run in the same direction. And keep in mind that one side of the blank will be to the outside, so you'll want the strip here to look good. Just mark the inside of the blank so you'll know which side gets the dado for the handle later on.

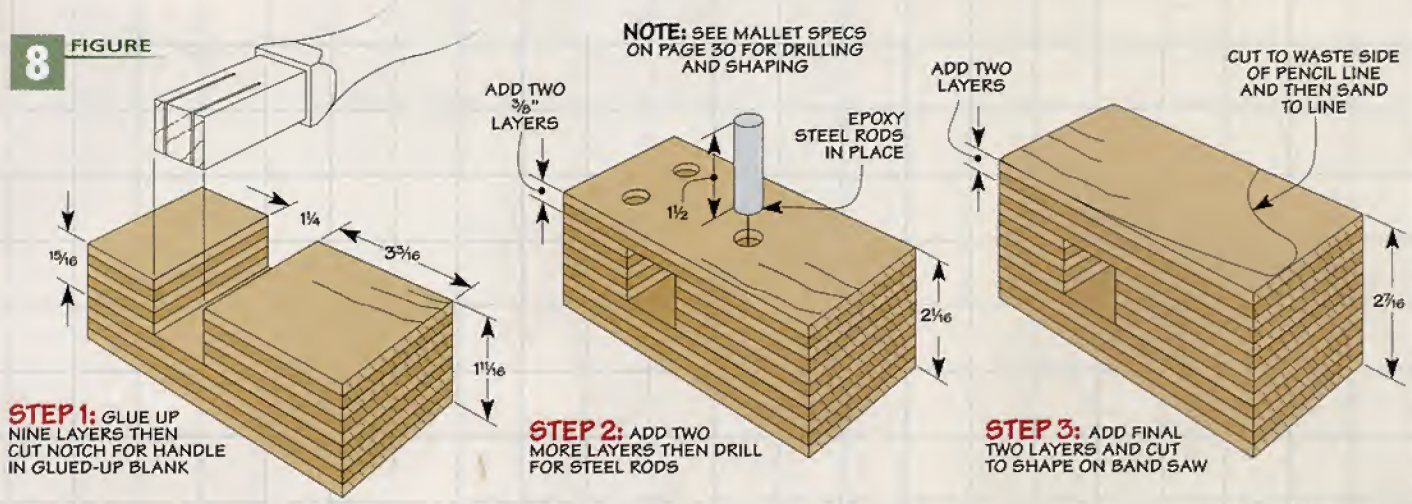
Cutting the "Eye." After the blank is dry, joint one edge so you've got a good reference face for cutting the handle opening. With that edge against the miter gauge, use a dado blade to cut the eye, as shown in Figure 8.

Adding Weights. The next step is to add two more layers and then add some weight to the head. After gluing the two layers in place, I drilled ½"-dia. holes for the short sections of steel rod. A little epoxy will hold them in place (Figure 8).

▲ ***Gentle Taps.*** *The small end reaches into tight areas to provide some "gentle persuasion."*

Mallet Specs





Final Layers. The only thing left to do to complete the glue-up is add the last two layers of laminations. The trick here is to make sure to use enough glue for a solid bond, but not get any glue in the dado you cut earlier. But if some glue seeps in, you can use a chisel to clean out the opening later.

Shaping. Once the glue dries, you can take the head to the band saw and cut it to shape using the pattern on the opposite page.

Here's where you want to take some extra time to get the shape of the head just right. A drum sander or belt sander is handy for removing saw marks. And "crowning" the large end slightly keeps the mallet from marring a workpiece.

Once you're happy with the final shape, head over to the router table and rout a ¼" roundover on the outside edges and give everything a final sanding.

SHAPING THE HANDLE

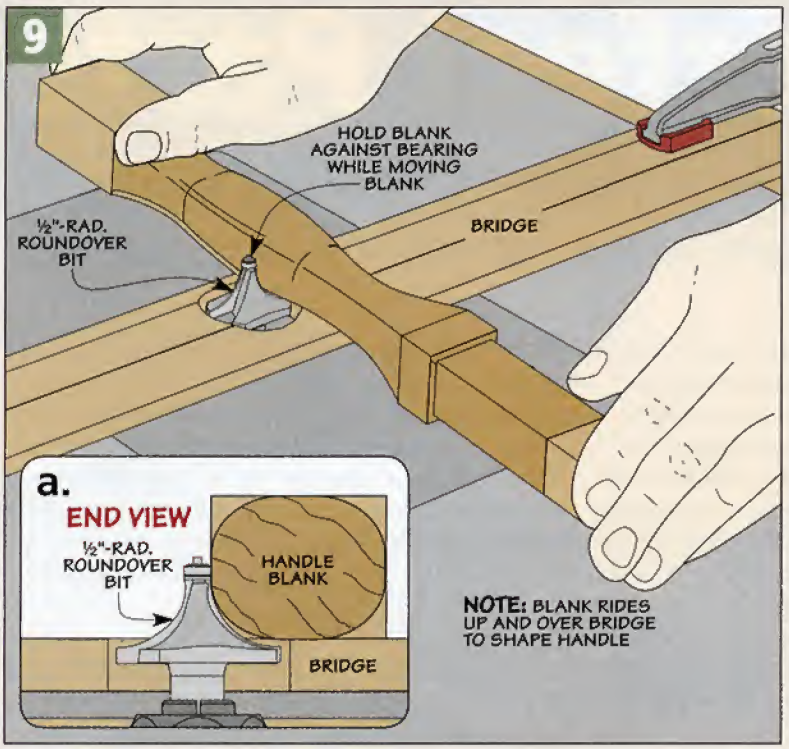
Starting with an extra-long blank, the handle for the cabinetmaker's mallet is shaped using a technique similar to that used for the carver's mallet. First, use the pattern on the opposite page to shape the handle. Then round over the sharp edges using the same "bridge" technique on the router table.

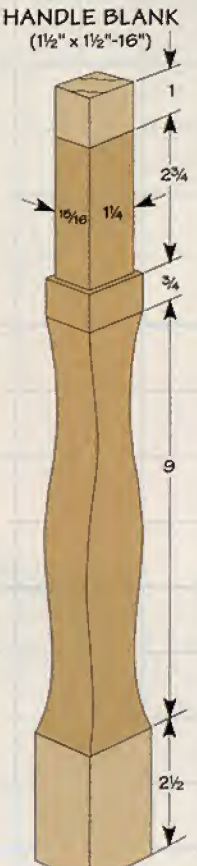
To form the tenon, I used a dado blade. You're aiming for a snug fit in the eye. The glue and wedges you'll add later will hold everything tight. I left the tenon a little long so I could trim it flush later.

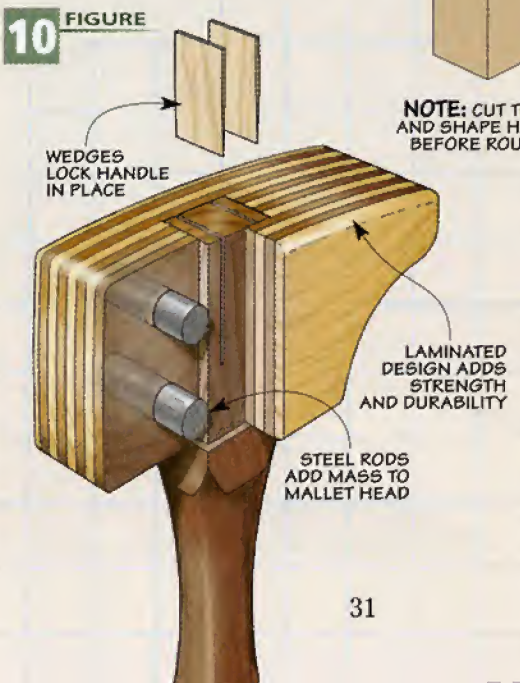
Next, step over to the band saw and cut two slots in the tenon for the wedges and cut off the "tail" of the handle. Once again, you can use rasps and sandpaper to fine-tune the shape. Take the time to shape the handle so it feels right to you, then sand it smooth.

As before, cut the wedges at the band saw. After adding a little glue, tap the handle in place. Finally, glue in the wedges and then trim and sand everything flush. A coat of oil is all you need to finish it off.

With their practical function and sturdy construction, these mallets will have a permanent home in your shop for years to come.







the secrets to cutting Perfect Parts

Use your band saw, a router, and this fool-proof technique to make perfect, identical pieces.

Cutting several pieces to the same size sounds simple, right? It's easy to do if the parts are straight and square. But if the parts include angled cuts or curves, then it can be tough to make multiple, identical parts.

The nice thing is, you don't have to settle for less than perfect results. I've found the best way to make matching pieces is to use a technique that combines a template with your band saw and router.

Now I know that making a template sounds like a time-consuming step. But in the long run, I think you'll find that adding this step will save you headaches and hassles down the road. You may even find that you'll save some time, too.

Easy-To-Use Process. The biggest advantage of using a template is consistency. Once you've made a good template, all the parts that are made from it will be exactly the same. Of course, there's more to it than simply making a template. In the following pages, I'll show you a straightforward approach for making templates and using them at your band saw for rough cutting and then flush trimming parts with a router.

MAKING A TEMPLATE

The starting point for creating a template is laying out the overall shape of the final workpiece. While you could do this right on your template blank, I like to

make a paper pattern first, as you can see in the photo at right.

A paper pattern has a couple of advantages I'd like to point out. First, it's much easier to see markings on white paper. And you can correct the shape you're drawing without much trouble.

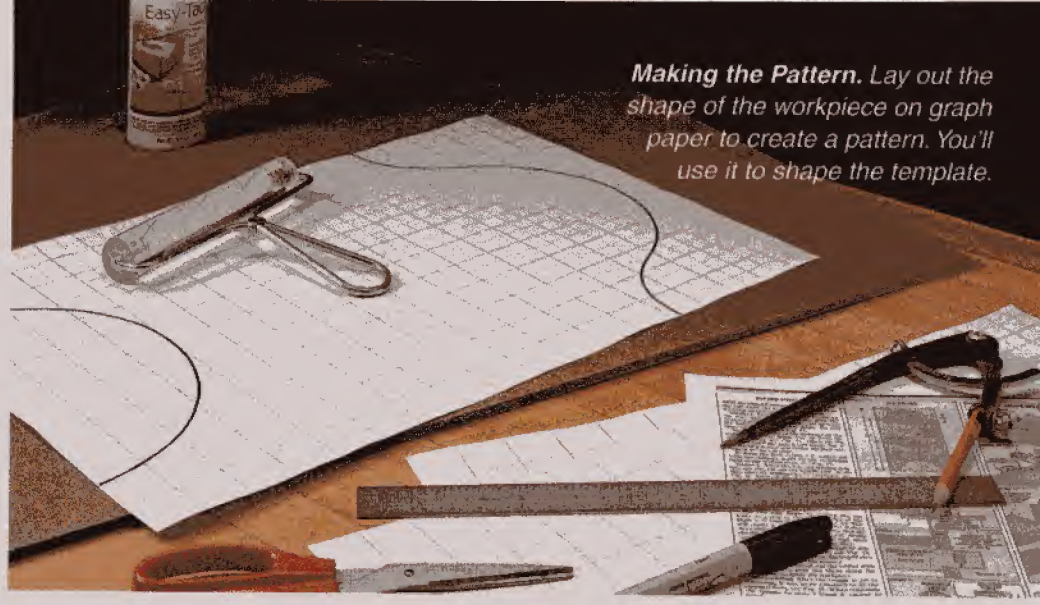
In the pattern shown at right, I transferred the profile onto some graph paper based on the project plans. But there's another way you can make a pattern. Many plans include a scaled drawing of the workpiece. So if you have access to a photocopy machine, you can enlarge the drawing to create a full-size pattern.

When you're satisfied with the look of your pattern, you'll attach it to the template blank to shape the template. For this, I use spray adhesive (photo above).

Template Material. But what exactly do you make a template from? To be honest, you can use just about any stable material, like plywood, MDF, or even acrylic.

The template material of choice for me is ¼" hardboard. It's thick enough to provide a solid bearing surface for cutting and routing. And I like it because its even texture means it can be cut and smoothed to shape without splintering or chipping.

Shaping the Template. Since the final workpieces you make will only be as accurate as the template, you want to take extra care to make sure the template edges are as smooth as possible.



Making the Pattern. *Lay out the shape of the workpiece on graph paper to create a pattern. You'll use it to shape the template.*

To shape the template, I start by rough cutting the blank. For this, I turn to my band saw fitted with a ¼"-wide blade. This all-purpose blade is narrow enough to handle most curves. But the band saw doesn't leave a smooth enough edge to use as a guide for flush trimming on the router.

Instead, stay just to the waste side of the pattern (about 1/16"). Leaving a little extra waste allows you to clean up the blade marks and create a smooth edge. An easy way to do this is to use a drum sander mounted in the drill press, like you see in the photo below.

ATTACHING THE TEMPLATE

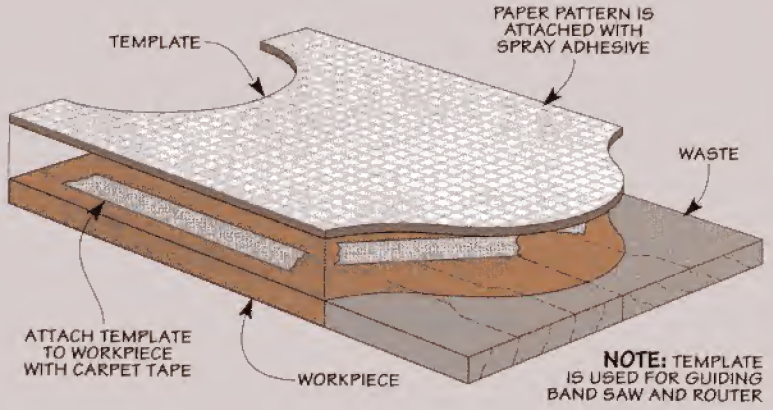
In order to use your template, you'll need to attach it to the workpiece. And you have a couple of options: carpet tape or screws.

Carpet Tape. The one I use most often is carpet tape. It's my favorite because it provides a secure grip without marring the workpiece. The only downside is you'll go through a lot of tape if you have a large number of pieces to make.

Screws. Your other choice is to attach the template with screws. There's no question they provide a solid hold. The key is to locate them where the holes won't be visible when the project is complete.

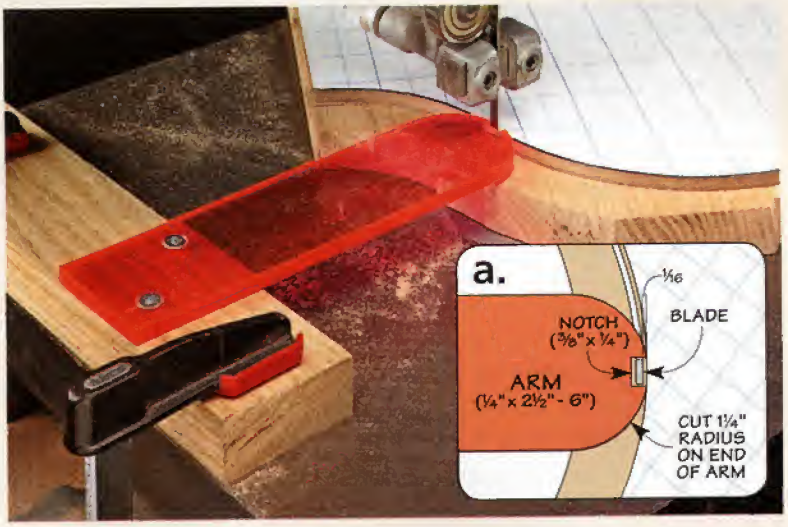
There's one final thing I'd like to mention before moving on. It's a good idea to label the template with the project name and any other important information that will help jog your memory should you use it again in the future.

On the next two pages, you'll put your template to work in the two steps of creating the workpieces — cutting and shaping.



Drum Sander. *After rough cutting the template to shape at the band saw, smooth out the saw marks with a drum sander.*

rough cut on the
Band Saz



Taking the extra time to create a template gets you to the next stage in the process: using it to create identical workpieces. As I mentioned before, there are two steps to work through. The first step is rough-cutting the pieces at the band saw. The second is trimming them at the router table.

Rough Cutting. I used to cut the pieces freehand at the band saw. This was a slow and nerve-wracking experience.

The goal when cutting is to stay as close to the layout line as possible. This way, there isn't as much material to remove for the following flush-trimming step. On the other hand, you don't want to cut across the layout lines, ruining the workpiece and template.

Rub Arm. The solution is to use the same template that will guide your router bit as a guide for the band saw. All you need is a way to allow the blade to follow the template. To do this, I made the rub arm you see in the drawing above and in the photo on page 32.

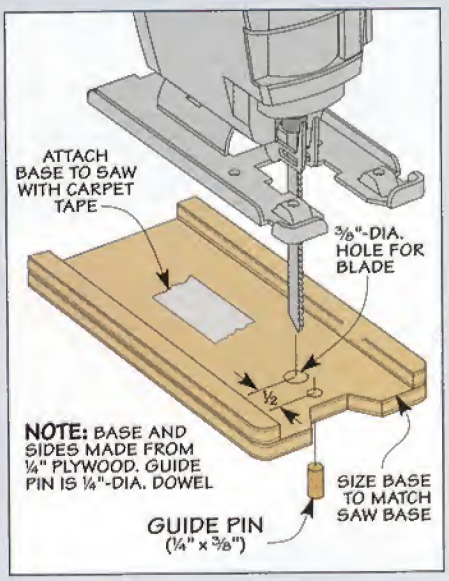
The band saw blade is recessed in a notch in the rounded end of the rub arm. The acrylic rub arm follows the edge of the template, guiding the cut. This allows you to quickly cut out each workpiece without worrying about spoiling the profile. It also leaves a thin, consistent amount of material for the router to remove later on.

The rub arm is attached to a block that gets clamped to the saw table. The rub arm needs to clear the workpiece below, yet stay in contact with the template. So the block needs to be a bit thicker than the workpiece.

Pattern Sawing. In detail 'a' above, you can see the setup of the rub arm on the band saw. Cutting with the rub arm is pretty straightforward, but there's one thing I'd like to highlight.

The idea is to focus your attention on keeping the edge of the template parallel to the blade and in contact with the rub arm. At the same time, you need to provide

Template Cutting:
Jig Saw Guide



It's much easier to rough cut large pieces using a jig saw. The trouble is trying to stay close to the layout lines. To make things a little easier, I came up with a way to guide the saw along a template (photo at right).

The guide is nothing more than a 1/4" plywood base with narrow sides that cradle the saw foot. (It's held in place with carpet tape.) A guide pin mounted ahead of the blade follows the edge of the template and keeps the blade from drifting into the template and damaging the workpiece (drawing at left).

To use the guide, I steer the jig saw with one hand and place the other hand on the base to keep the guide pin in contact with the template. When you're finished cutting, you'll have a thin amount of waste to remove with a router.

steady pressure to move the workpiece along for a smooth cut.

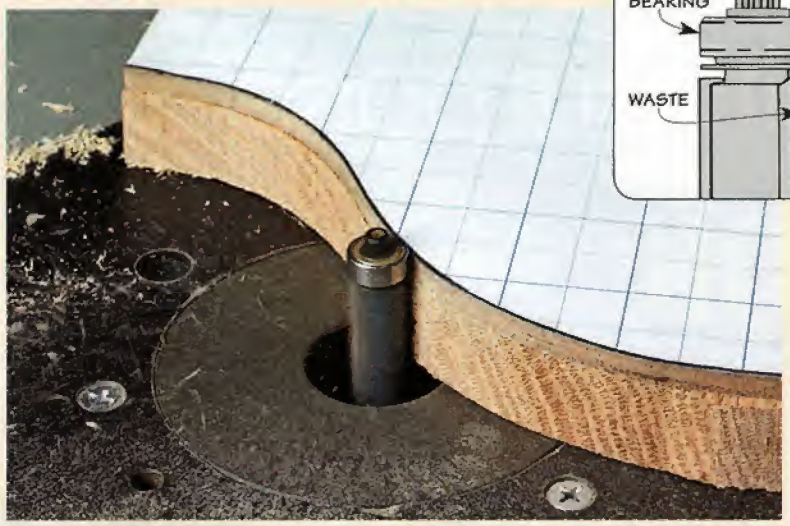
Jig Saw Works, Too. But what if you don't have a band saw? Don't worry. You can use an ordinary jig saw and a simple auxiliary baseplate. For details, take a look at the box on the opposite page.

SMOOTHING THE PIECES

Using the template and rub arm to cut out the workpieces means the edge will be a lot smoother than a freehand cut. But you'll still need to remove the blade marks to bring the piece to final shape. And for this I turn to the router.

Two Techniques. There are a couple of ways you can go about trimming the workpieces flush to the template. You can use the router table with a flush trim bit or a hand-held router with a pattern bit. Both methods will give you great results. But I want to mention a few details about each technique that will help you get the best results.

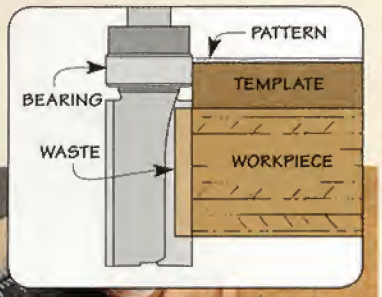
Router Table. Let's start with the router table, as shown in the photo above. This is the option I use most of the time. Fitted with a flush trim bit, you have a lot of visibility as the bearing on the bit follows the edge of the template.



◀ ***Router Table.*** *Flush trimming a workpiece on the router table will give you a good view of your progress.*

One of the big advantages of this technique is that other than the bit height, there are no other setup steps to take care of, as you can see in the detail drawing above. Just turn the router on and start trimming the piece to shape.

Watch the Grain. As you're trimming away the waste, pay close attention to the grain direction. In curved sections, you may notice some chipout occurring. If that happens, it's best to pull back and try routing from the opposite direction (backrouting).



Pattern Routing. *On large workpieces, a hand-held router and a pattern bit make quick work for trimming the workpiece flush to the template.*

Hand-Held Router. The router table works best for small and mid-sized workpieces. But when the parts are large, I switch to a hand-held router. I find that it's easier to control a router than trying to wrestle with a large workpiece on the router table, as you can see in the photo at left.

There are a couple of other differences to mention as well. The first difference is the bit used to make the cut — a pattern bit. The bearing on this bit is mounted on the shank, as shown in the detail at left. This allows the template to remain on the top of the workpiece, and that lets you keep an eye on what's going on.

However, there's a downside to using a pattern bit. With the bearing on the shank, you need to extend the bit so the full length of the flutes are exposed. So to avoid damaging your workbench, make sure the workpiece is supported above the benchtop. Along with that, you'll need to make sure the workpiece is held securely.

Flawless Results. When you turn off your router, you'll be left with a smooth, perfectly shaped part. And having used a template to cut and shape them, you can be sure each part is absolutely identical. Consistent results, and efficient working methods make creating a template well worth the effort.

best built jigs & fixtures

multi-purpose Table

Take your hobby anywhere with this portable worksurface.

The table you see here is like a workbench in a kit. Slide a panel here, twist a knob there, and it converts from a portable "briefcase" to a sturdy workstation for your hobbies.

But don't let its small size and portability fool you. This table is designed from the ground up to provide a solid, stable platform for working on hobbies and crafts. It all starts with the four stout legs that slide securely into deep sockets in the top and lock in place with a few knobs.

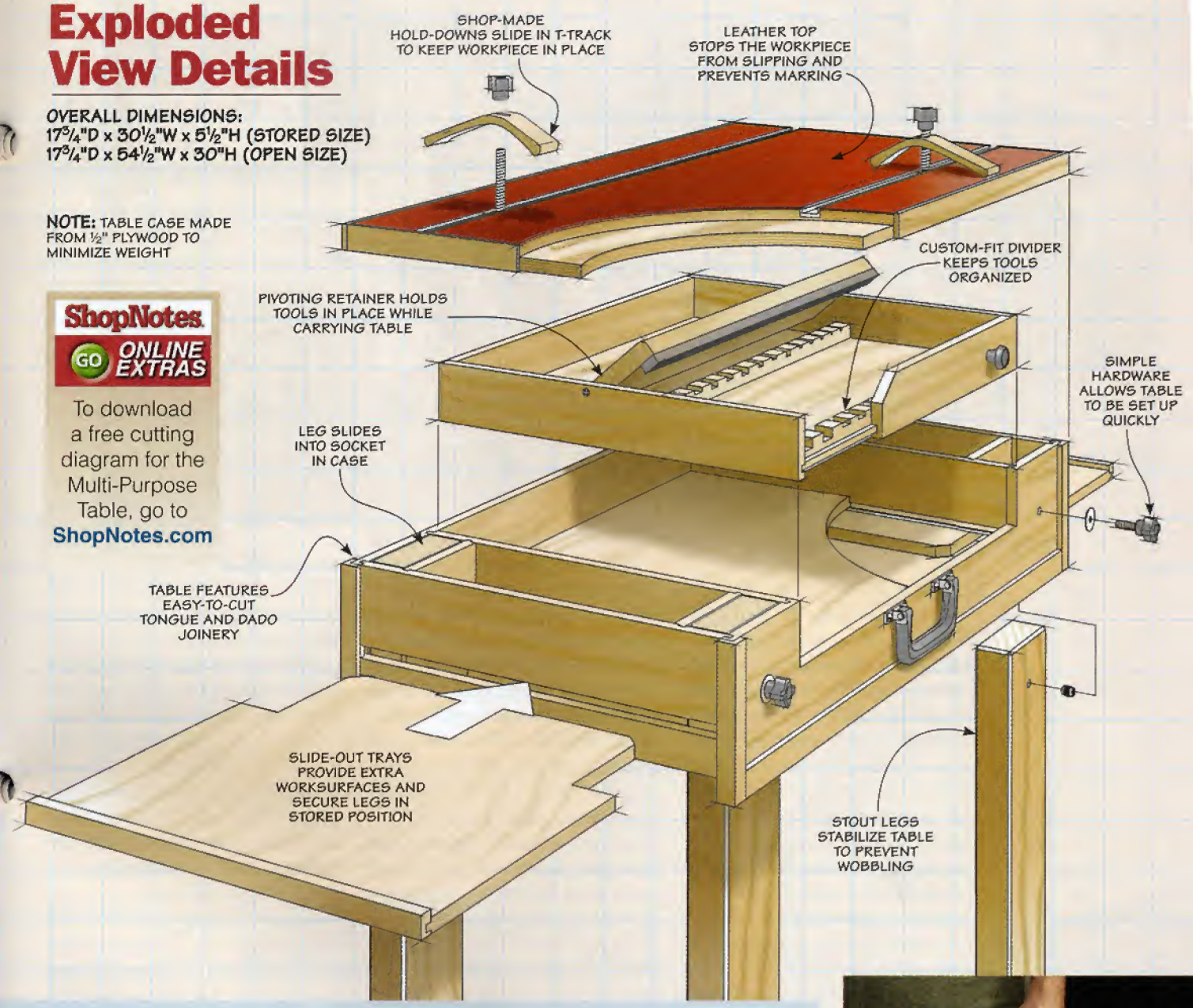
Now let's talk about the work area. The leather top and T-track give you lots of options for clamping your work and protecting it at the same time. Two slide-out trays add extra worksurfaces for your tools. There's even room for a storage drawer.

When you're done for the day, you long to fold up the table, as shown on the facing page.

Exploded View Details

OVERALL DIMENSIONS:
17¾"D x 30½"W x 5½"H (STORED SIZE)
17¾"D x 54½"W x 30"H (OPEN SIZE)

NOTE: TABLE CASE MADE FROM ½" PLYWOOD TO MINIMIZE WEIGHT



ShopNotes GO ONLINE EXTRAS

To download a free cutting diagram for the Multi-Purpose Table, go to **ShopNotes.com**

Materials & Hardware

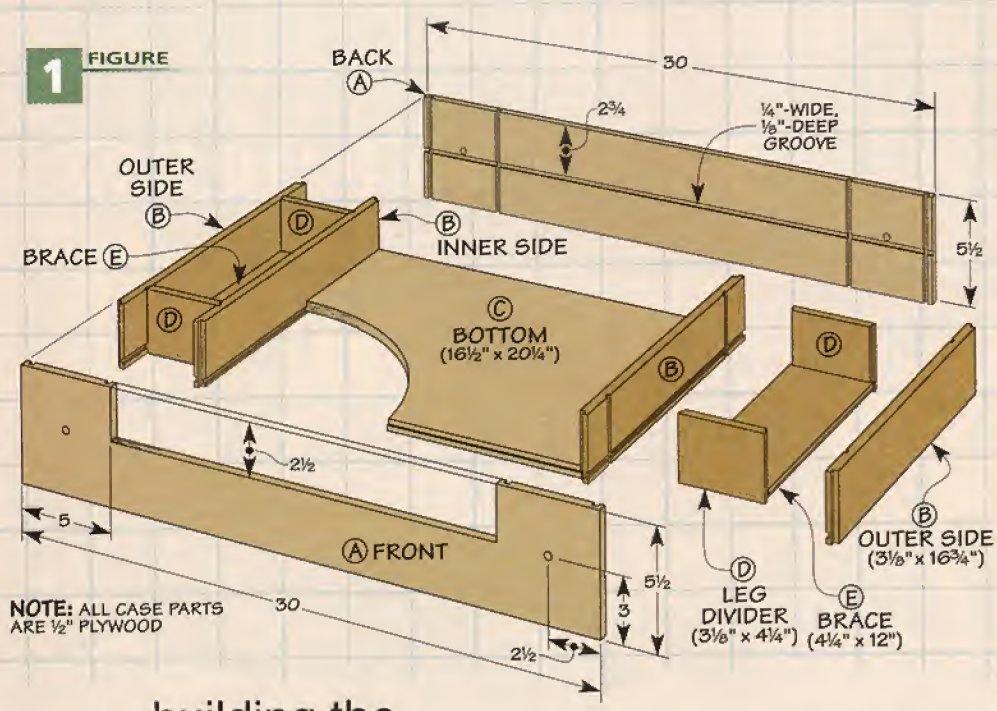
CASE

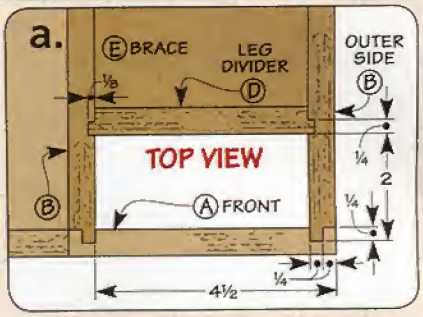
A	Front/Back (2)	5½ x 30 - ½ Ply.
B	Sides (4)	3⅛ x 16¾ - ½ Ply.
C	Bottom (1)	16½ x 20¼ - ½ Ply.
D	Leg Dividers (4)	3⅛ x 4¼ - ½ Ply.
E	Braces (2)	4¼ x 12 - ½ Ply.
F	Tray Supports (2)	1⅜ x 16¾ - ½ Ply.
G	Top (2)	17¼ x 30 - ½ Ply.
H	Edging (1)	¼ x 1 - 96
I	Leather Worksurface (1)	17¼ x 30
J	Hold-Downs (2)	1½ x 1¼ - 6
K	Legs (4)	1¾ x 4 - 29
L	Lower Trim (2)	1 x 1 - 30
M	Corner Trim (4)	¾ x ¾ - 5¾
N	Trays (2)	16¼ x 15 - ½ Ply.
O	Tray Ends (2)	½ x ¾ - 16¼
P	Tray Stops (2)	¼ x ½ - 8⁵⁄₁₆

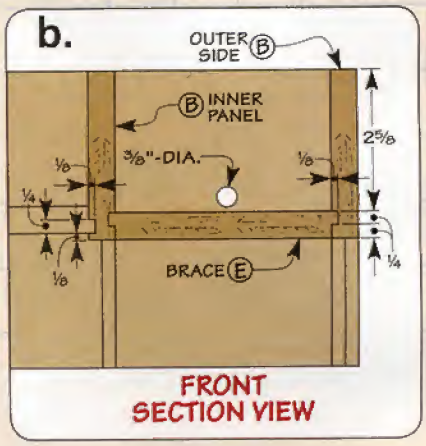
DRAWER

Q	Drawer Front/Back (2)	2⁷⁄₁₆ x 19⅞ - ½ Ply.
R	Drawer Sides (2)	2⁷⁄₁₆ x 16½ - ½ Ply.
S	Drawer Bottom (1)	16¼ x 19⅜ - ½ Ply.
T	Tool Organizers (2)	¾ x ¹¹⁄₁₆ - 18⅞
U	Retainer (1)	¾ x 4 - 18⅞

- (2) 30" T-Track
- (2) ⁵⁄₁₆"-18 x 3½" Flange Bolts
- (4) Star Knobs w/ ¼"-20 x 1" Stud
- (2) Drawer Knobs w/Screws
- (1) Suitcase Handle w/Screws
- (4) ⁵⁄₁₆"-18 Threaded Inserts
- (2) Hold-Downs (optional)
- (18) #6 x ⅝" Fh Woodscrews for T-Track
- (2) ¼"-dia. Rare-Earth Magnets
- (1) ¾ x 18⅞ - ½ Foam







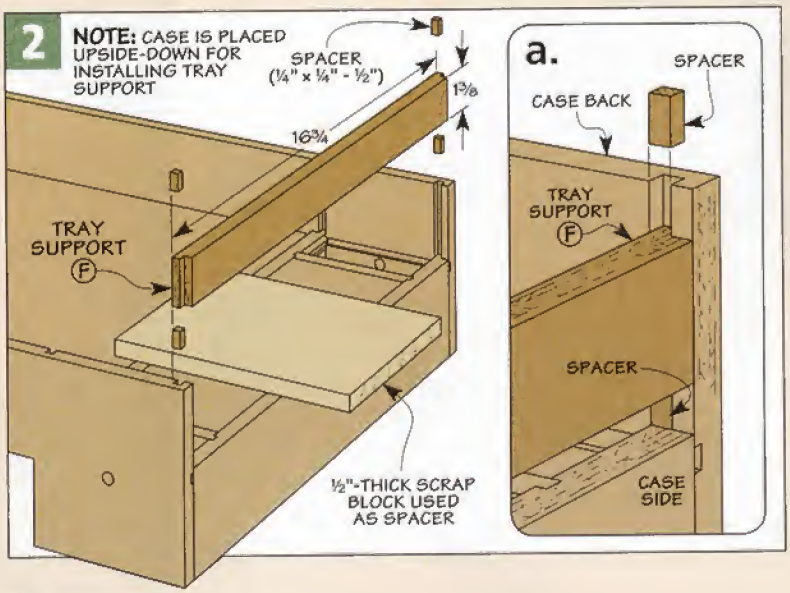
building the Case

The heart of the project is the case. Not only does it provide a sturdy worksurface, but it also becomes a storage box. Everything packs away when you're done working at the end of the day.

If you take a look at the drawings above, you can see how the case is put together. You'll notice that there are internal dividers that form the "sockets" for the legs and the opening for the drawer. All of these pieces are assembled using tongue and groove joinery that you can cut at the table saw.

Front and Back. All of the case pieces are made from ½" Baltic birch plywood. I started with the front and back. But to be sure the dadoes for the sides lined up, I made them from a single, wide blank that was trimmed to length. You can use a dado blade to cut all the vertical dadoes. Then you can rip the blank in two and trim the two pieces to width.

As you can see in Figure 1, the front and back have a groove that accepts the case bottom. Once you cut that groove, you can go ahead and cut out the drawer opening in the front. While you're at it, drill the holes for the studded knobs that will secure the legs.



Sides. Figure 1 shows you that there are really four "side" pieces — two that complete the outside of the case and two that create the drawer opening. The nice thing is they're all the same except for the grooves along the bottom edge.

I started by cutting the four pieces to final size. I used the same size dado blade on my table saw as before and cut the dadoes. You can use your rip fence as a stop to locate the dadoes from the end of the workpiece. Use your miter gauge to help guide the workpiece. Then all you need to do is rotate the workpiece 180° to cut the dado on the other end. While you're at the table saw, go ahead and cut the rabbets on the ends to fit the dadoes in the front and back.

Next, you position the rip fence to cut the grooves along the bottom edges. Here is where it helps to mark the pieces. The two inside pieces that will form the drawer opening have a groove on both sides, as shown in Figure 1b above. The two outside pieces that form the sides of the case only have a groove on the inside face.

Leg Dividers. With the sides complete, you can dry-fit them to the front and back then work on cutting the leg dividers to

fit between them. Like the side pieces, they'll need a groove along the bottom edge to hold the brace piece shown in Figure 1b.

Braces and Bottom. The brace pieces fit between the leg dividers and help support the legs when the table is assembled. The braces are rabbeted on all four edges to fit the grooves in the side pieces and leg dividers. And, using the same setup, the large piece that forms the bottom of the case gets the same treatment. After dry-fitting everything together, you're ready to glue up the case.

Tray Support. While you're waiting for the glue to dry, you can cut the tray supports and spacers, as shown in Figure 2. The only trick here is to use a ½"-thick spacer block when gluing the support in place. This will help ensure that the tray will slide without binding. With the supports in place, cut small spacers to fill the groove before moving on to the top.

WORKSURFACE

If you take a look at Figure 3 above, you'll notice that the top is made of two layers of ½" plywood. I did this to provide enough thickness and support for the two pieces of T-track that fit in grooves.

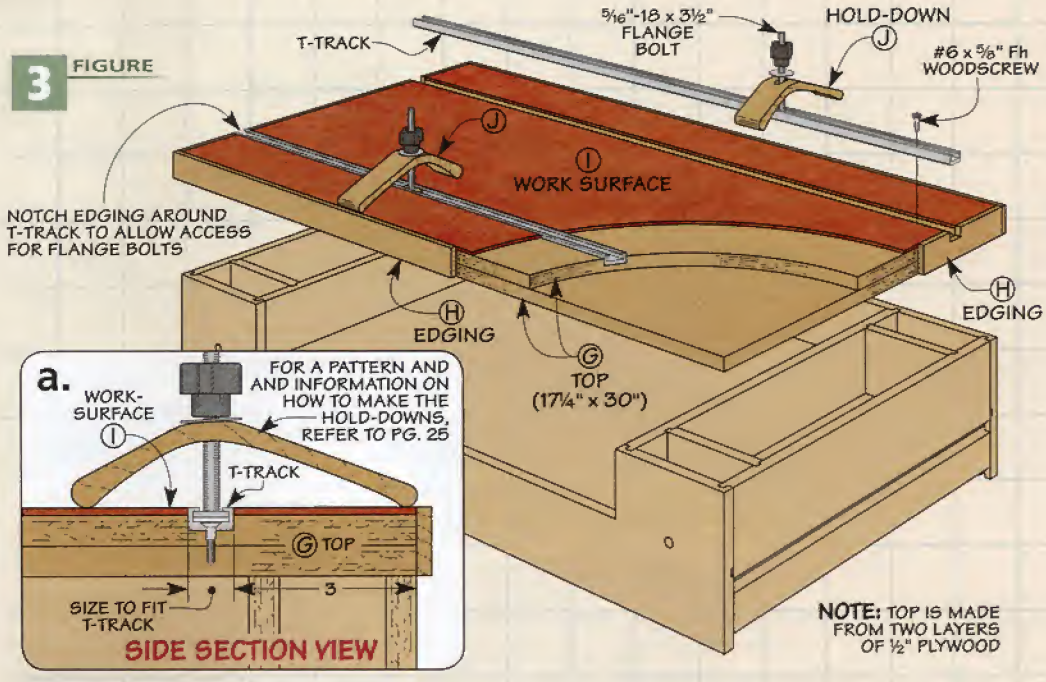
I started by gluing two oversized pieces together. Then I trimmed the top to final size. But before you can cut the dadoes for the T-track, you need to figure out what type of worksurface you want to have (see box below). This will determine the depth of the dado to ensure the T-track sits flush with the surface.

With that decision made, you can cut the dadoes and install the T-track and surface material. Hardwood edging applied to the top completes the top assembly, as you can see in Figure 3. Then glue the top to the case.

Hold-Downs. To clamp a workpiece in place, you can use either commercial or shop-made hold-downs (lower left photo below). Shop Short Cuts on page 25 shows you how to build your own.

At this point, you can turn the page to find out how to complete the table by building the legs, trays, and drawer.

FIGURE 3



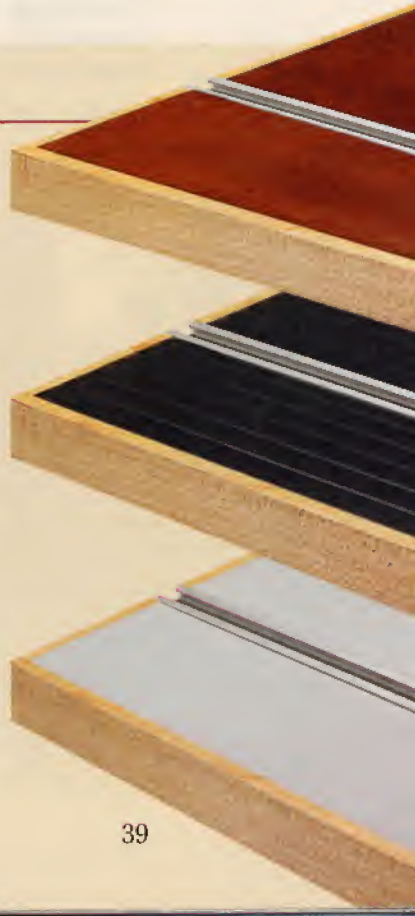
▲ ***Hold-Down Options.*** *Shop-made hold-downs (top) or purchased ones (bottom) make it easy to clamp your workpiece securely.*

Top Choices

The great thing about this table is that you can customize the worksurface for the type of work you do. For example, I chose leather (top photo) for mine because it's durable yet soft enough to be gentle on my carvings. It has a nice "give" to it that's easy on my tools.

Another great option is rubber sheeting, as shown in the middle photo. Similar to leather, it's gentle on an edge tool. But it's also great for gripping the workpiece so it won't slip as easily. And its "self-healing" properties make it a great cutting surface for crafts.

Finally, you could use a plastic laminate or melamine surface, like you see in the bottom photo. It's a tough surface that's easy to clean.



completing the Table

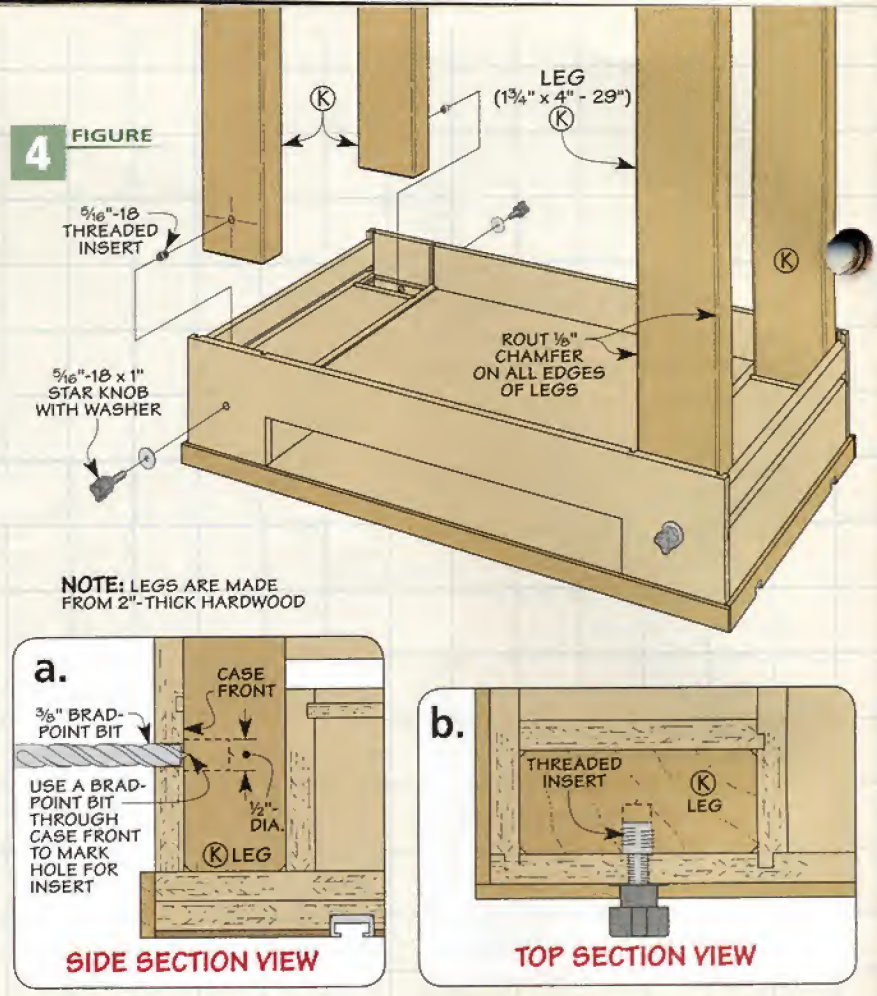
To complete the multi-purpose table, you'll first add four legs that fit into the "sockets" in the bottom of the case. You'll also make two trays that slide into the bottom of the case to form a hidden compartment for storing the legs. Finally, there's a drawer with storage that you can customize for your tools.

LEGS & TRIM

The legs you see in Figure 4 couldn't be simpler. They're just thick, hardwood blanks sized to fit the sockets on the bottom of the case. You're aiming for a snug fit here. If they're loose, you'll end up with a wobbly table.

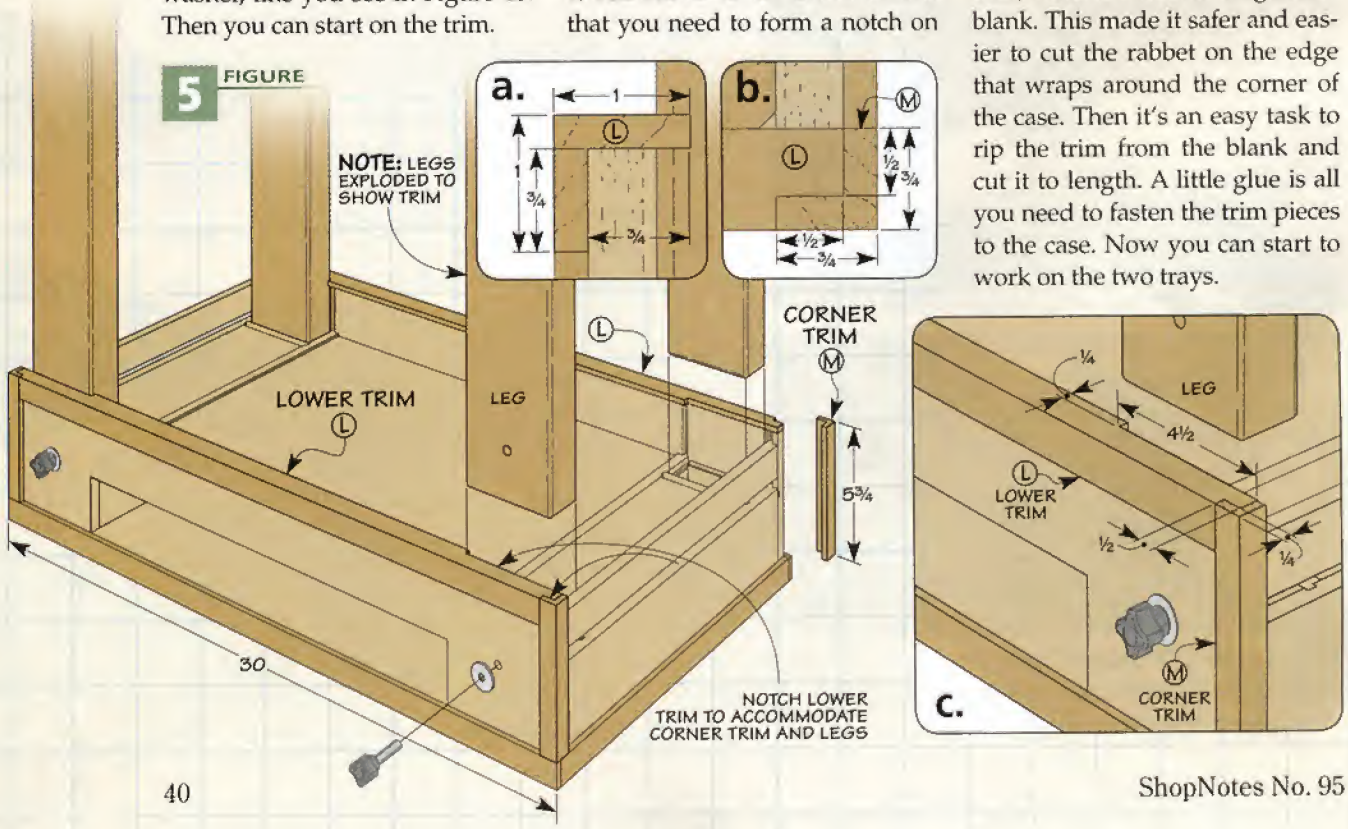
Once you're happy with the fit, chamfer all the edges. Then fit the legs in place and locate the holes for the threaded inserts. I used the holes in the case front and back as a guide to locate the holes in the legs (Figure 4a). All you need to do to finish the legs is install the inserts.

To fasten the legs to the case, I used a studded knob with a washer, like you see in Figure 4b. Then you can start on the trim.



Lower Trim. With the legs in place, you can work on adding the trim around the case. Figure 5 shows you everything you need to know to do this. The only thing to remember on the lower trim is that you need to form a notch on the ends to fit around the legs. And there's another small notch to accommodate the corner trim, as you can see in Figure 5b.

Corner Trim. For the corner trim, I started with a long, wide blank. This made it safer and easier to cut the rabbet on the edge that wraps around the corner of the case. Then it's an easy task to rip the trim from the blank and cut it to length. A little glue is all you need to fasten the trim pieces to the case. Now you can start to work on the two trays.



TRAYS

The trays on this table serve a dual purpose. When the table is open, they provide extra worksurfaces. In the "stored" position, the trays fit in the bottom to secure the four legs in the bottom recess of the case, as shown in Figure 6 at right.

Trays. You can start by cutting the trays to their final width and length. Sneak up on the width so the trays slide easily between the front and back of the case.

To finish the trays, cut the notches for the legs and add the tray end piece. I drilled a hole in the end of each tray for a ¼"-dia. rare-earth magnet to help keep the trays in place when stored.

Tray Stops. In Figure 6, you'll see that the trays slide in grooves formed by the lower trim piece and the stored legs. A set of tray stops keeps the trays from sliding into the case too far.

To locate and find the length of the tray stops, I inserted the trays and marked on the case where the end of the notches in the trays stopped. Glue the stops in place before starting to build the drawer.

DRAWER

The nice thing about the drawer for this table is that you can customize it for your tools. I made mine with a tool organizer to store my carving tools. Figure 7 shows how it all goes together.

The construction of the drawer itself is pretty straightforward. The sides are joined to the front and back with rabbets. And a groove in all four pieces holds the bottom in place. The ½" plywood bottom is rabbeted on all four edges to fit the grooves. A couple of knobs are all you need to finish out the drawer.

Tool Organizer. I made the tool organizer by cutting dadoes in a wide blank to form notches then ripping it down the middle. I glued the pieces in place, as illustrated in Figure 7c.

You'll want to install a retainer to keep the tools secure. It's nothing more than a hardwood blank with the top edges rounded over. A foam strip cushions your tools when the retainer is folded down.

Finally, attach a handle securely to the case (Figure 7). Now you're ready to fill the drawer full of tools and hit the road.

FIGURE 6

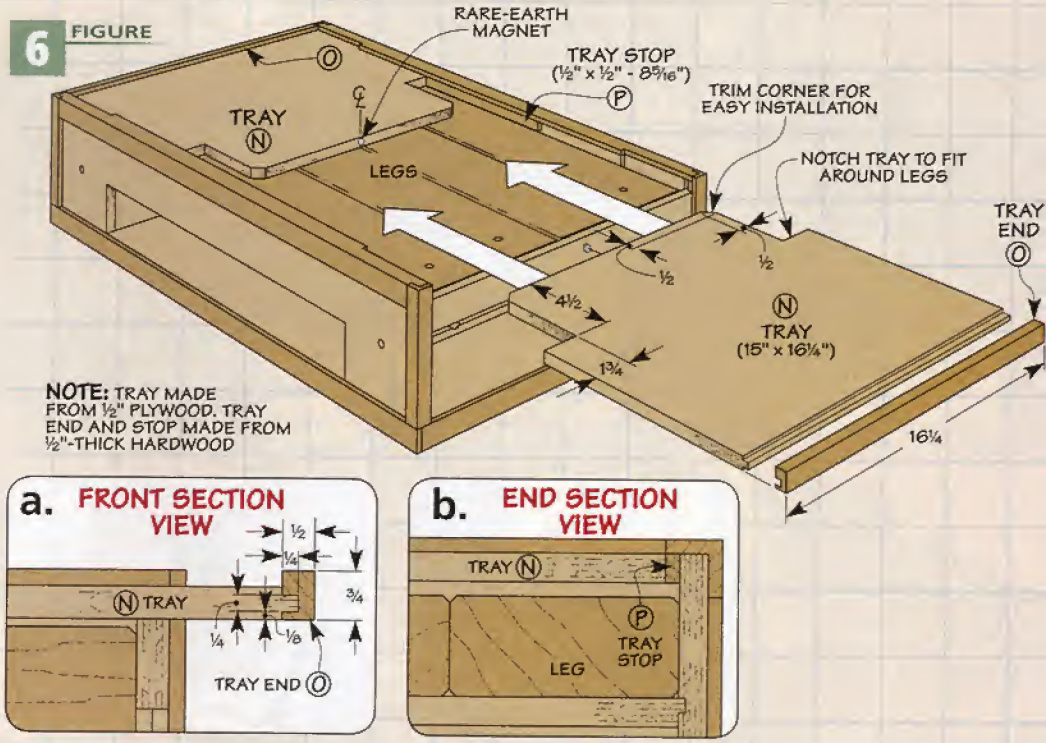
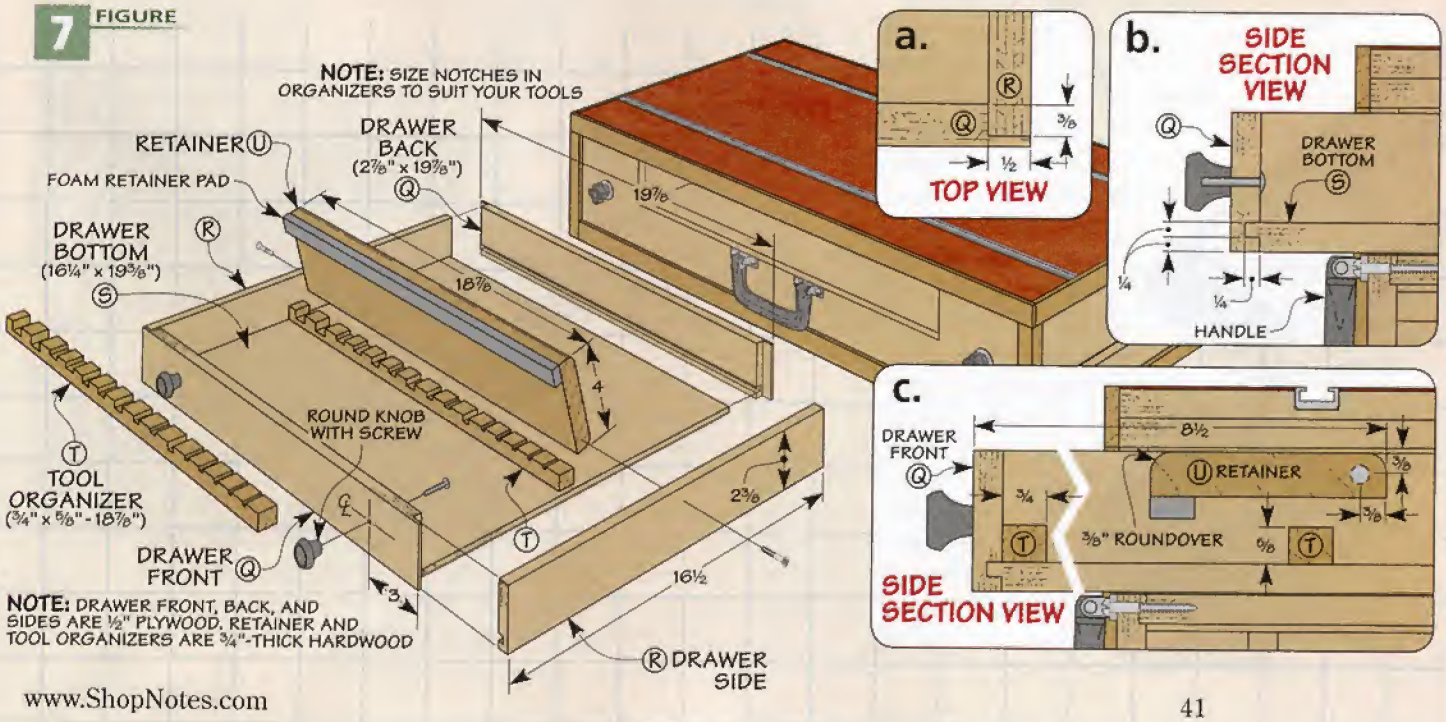


FIGURE 7



quick & easy Tool-Saving Tips

Protecting your tools from rust is a snap with these handy tips.

It always amazes me how quickly rust can appear on a tool. Sometimes it happens overnight. And even some types of tool guards can cause rust in a damp shop (margin photo at left). The good news is that there are several ways to protect your hand and power tools that won't require a lot of time or effort. Some are even a bit unconventional, but effective.

Cleaning. The first step in preventing rust is to remove any corrosion, dirt, and grime already on your tools. A little solvent like paint thinner, lacquer thinner, or denatured alcohol on a rag will tackle most grime. And for light rust, you can use *Sandflex Rust Eraser* blocks or *3M's Scotch-Brite* (refer to Sources on page 51).

With the tool clean and dry, you're ready to take the steps needed to help keep rust at bay. How you do this depends on whether it's a hand tool or a stationary power tool.

▼ ***Trapped Moisture.*** *Plastic guards can trap moisture against the steel, causing rust.*

HAND TOOLS

When it comes to hand tools, I'm mainly concerned with keeping them tuned up and sharp. But there are also a few simple things you can do to prevent rust.

A Quick Wipe. Steve Johnson, our shop craftsman, uses his hand tools quite a bit. When he's putting them away at the end of the day, he just gives them a quick wipe with camellia oil (main photo above). It takes no time at all to apply and he says he's never had a problem with rust, even in his basement shop.

You might think that any lightweight oil would do the trick. But unlike camellia oil, it may stain the wood.

Aerosols. Another quick and easy solution is to use a spray. And if you walk down the aisle at the hardware store, you'll find dozens of spray products that claim to prevent rust. The idea is to form a protective barrier against moisture on the steel. But for woodworkers, it's also important to know what's in the product.

No Silicone. Using any product that contains silicone or *Teflon* can spell trouble when it comes time to finish your project. If it rubs off onto the wood, the finish may not adhere properly. So it's best to steer clear of these products altogether.

A Quick Spray. When choosing a rust-preventative for my tools, I like to use products that are

▲ ***Corrosive Fingerprints.*** *Sweat and skin oils can be corrosive. A quick wipe after use is a good way to prevent rust.*

woodworker-friendly and compatible with my tools and projects. One such product I like to use is *Boeshield T-9*. It leaves a thin, waxy film. And all it takes is a quick spritz. You can wipe off the excess or just let it dry to form a heavier film (photo at right).

Wax On. Woodworkers are pretty passionate about which products work best for rust protection. And they all seem to have their favorite paste wax. From expensive, museum-quality waxes to inexpensive furniture waxes, the point is they all work to protect against moisture. You're just aiming for a thin, protective layer.

Spray Protection. *A spritz of rust preventative will keep your hand tools looking new.*

POWER TOOLS

It seems like the cast iron surfaces on a stationary power tool are the worst for attracting rust. And that's especially true if your shop is in a basement or garage. But it's easy to combat rust.

A Porous Surface. Why does cast iron rust so fast? It's because it's so porous. There are tiny openings in the metal, and these pores are great collection spots for any moisture in the air.

So, like your hand tools, the key is to provide a protective barrier. And, to do this, you can use one of the many products I mentioned earlier. But there are a couple of low-cost, "unconventional" treatments you can try.

Waxed Paper. I talked about using paste wax, and that will do a good job. But there's a quicker, no-mess way to apply some wax.

Wax Applicator. *Buffing cast iron tools with waxed paper adds some moisture protection and shine.*

Crumple up some waxed paper and rub it vigorously on your table saw table and the beds of your planer and jointer (lower left photo). Besides protecting them from rust, it also forms a slick surface.

Smooth as a Baby's Bottom. Another unconventional technique is using baby powder or talcum powder. When you think about its original use, it makes a bit of sense — talc repels moisture. But you have to make sure you use powder made from talc and not corn starch. While talc resists moisture, corn starch will absorb it.

Just sprinkle the powder liberally on the surface and rub it in with a felt chalkboard eraser (photo above). The talc works its way into the pores to repel moisture and leaves a smooth surface.

The bottom line is, protecting your tools from rust doesn't need to be an all-day chore. Your tools will thank you for the attention. For long-term rust protection for tools you need to store or move, see the box below.

▲ ***Powder.*** *Talc found in baby powder protects cast iron and creates a slick surface.*

Tool Storage: Long Term Rust Control

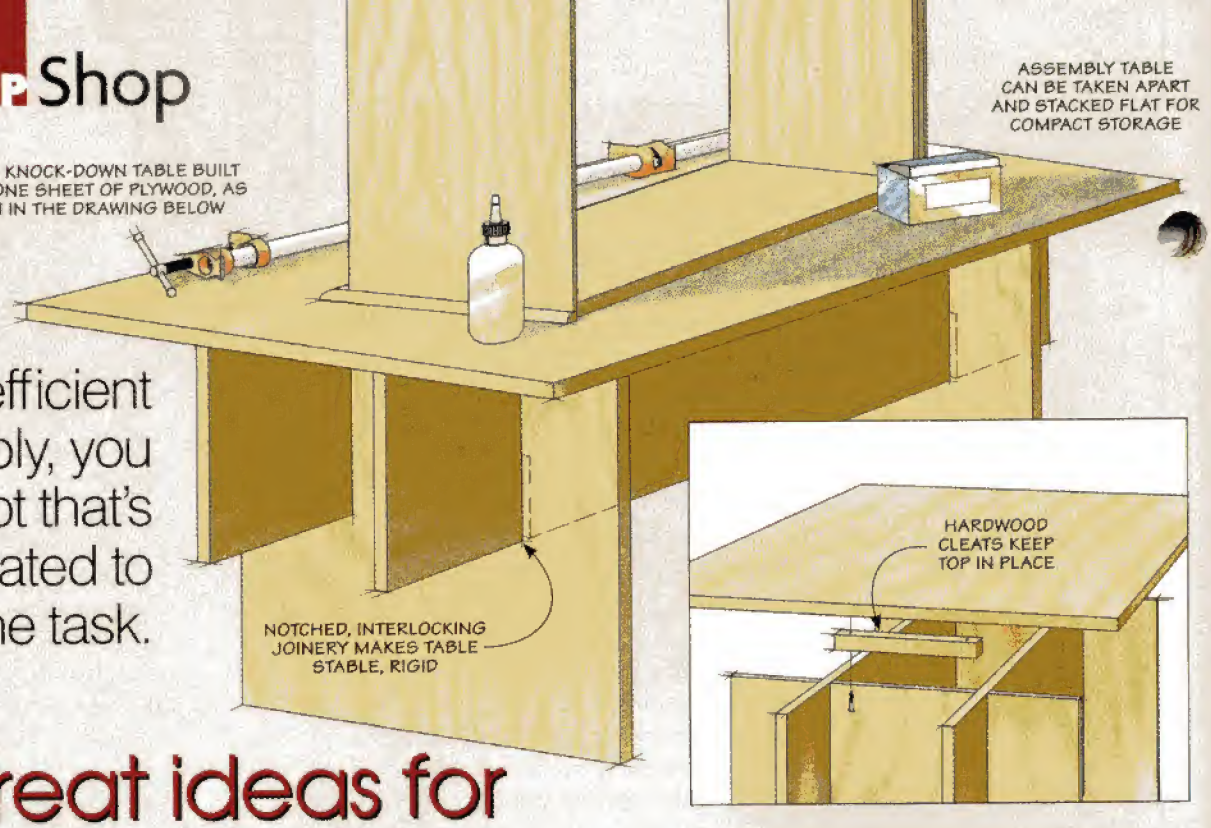
If you have to move your shop or store your tools for several months or years, you need to be concerned about the potential for rust.

The key to long-term rust protection is adding a durable coating to act as a barrier against all forms of moisture. The product shown at right is just one example. It can protect a tool from rust for up to two years.

But if you can't find these products, you can use a couple coats of paste wax or spray a heavy coat of a product like *Boeshield T-9*.

When putting the tools back into action, just clean off the rust preventative with a solvent. And take the time to perform any other maintenance needed. Then re-apply a rust preventative as discussed above.

► ***Thick Coatings.*** *Waxy or oily coatings will keep your tools rust-free for long-term storage.*

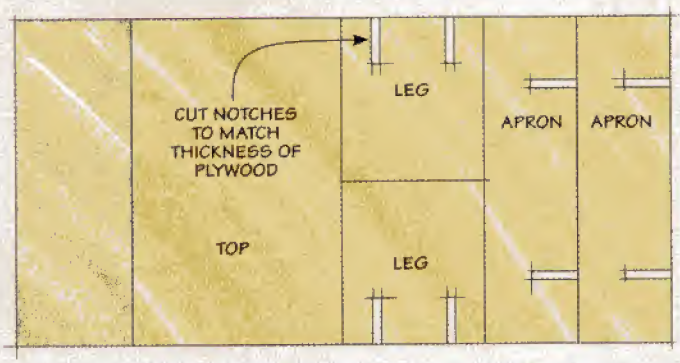


For quick, efficient assembly, you need a spot that's dedicated to the task.

3 great ideas for Assembly Tables

When I started woodworking, I assembled projects right on the top of my workbench. But that created a big problem. With a partially assembled project on the bench, there wasn't much space left to do any other work.

The solution is to have a separate worksurface dedicated to assembly. So if you're tired of tying up your workbench (or other handy surfaces) while the glue dries, take a look at these three assembly table options. I'm sure you'll find one that will suit your needs.



KNOCK-DOWN TABLE

When I first considered making an assembly table, I wasn't quite convinced that my shop had the space for another permanent fixture. That's why the knock-down table, shown in the drawing above, is such a great option.

Despite its plain looks, this table has a lot of things going for it. The most obvious is its simple, notched construction. This lock-together joinery creates a stable platform and allows it to be set up and taken down quickly.

To keep the cost down, I sized the parts so the table could be made from a single sheet of plywood. The cutting diagram at left shows how the pieces can be laid out on the sheet. You can scale the size of the top and the length of the legs to find a height and overall size to suit your needs.

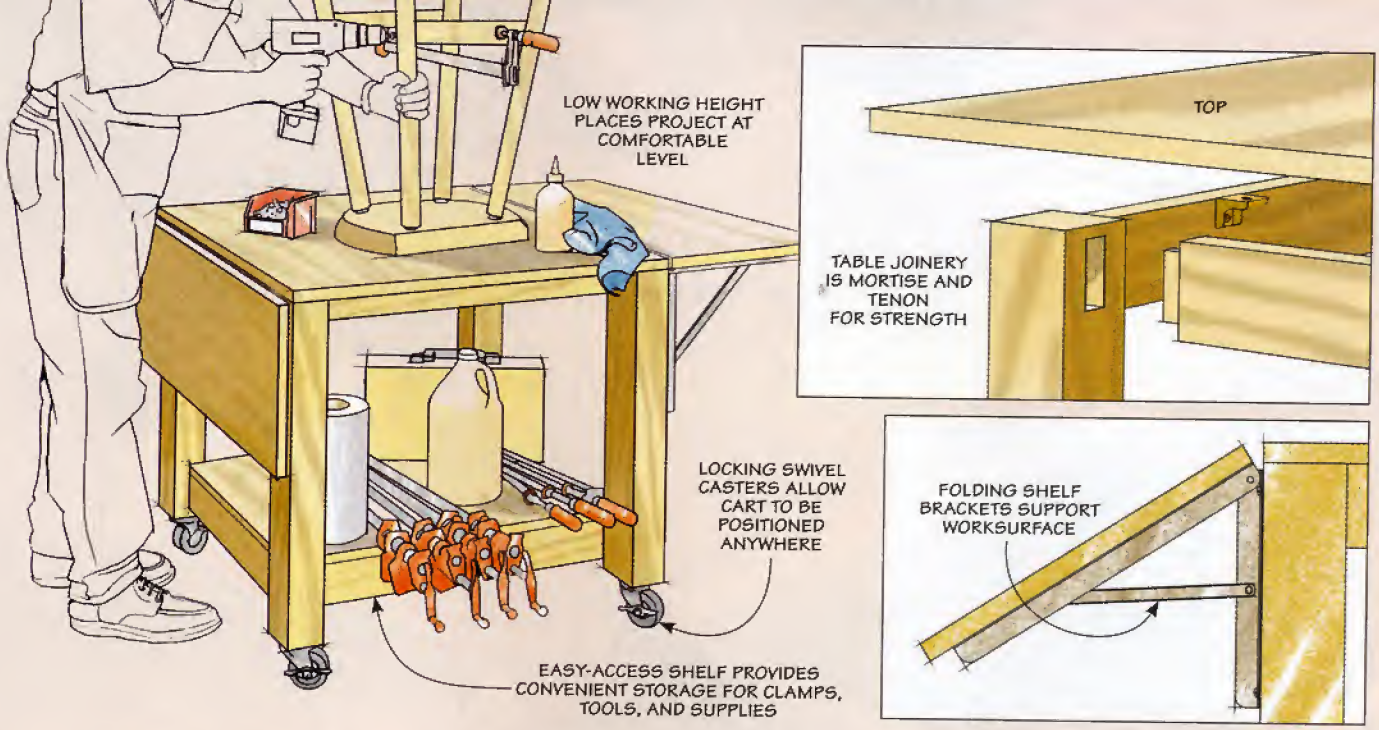
This doesn't mean you should use any old piece of plywood for the table. For an assembly table to be useful, it needs to be flat. So sort through the plywood stack to find the flattest sheet available.

Another nice advantage to using plywood parts is that the disassembled table stores flat and doesn't take up much space when you're not using it. And, when the table is stored, it can't collect clutter like other surfaces tend to.

ROLL-AROUND CART

If your shop has a little more room to spare, you might consider an assembly table that's a step up from the knock-down table. And that's the rolling cart shown on the top of the opposite page. It gives you a permanent place to work that can be placed anywhere.

First of all, it sits on locking, swivel casters. Not only does this allow you to move the cart (and project) to the most convenient workplace, but you can easily access all sides of an assembly



simply by spinning the cart around. When you're finished using it, just roll it out of the way.

To make the cart easy to move, I kept the size relatively small. But a small worksurface won't always fit the task at hand. So I added flip-up wings that are firmly supported by folding shelf brackets.

This cart has one other feature that I should mention. I placed a shelf between the lower stretchers. It provides some easy-access storage when I'm working.

I didn't want to skimp with lightweight construction. So I used traditional mortise and tenon joints to connect the upper and lower aprons to the beefy legs, as shown in the detail above.

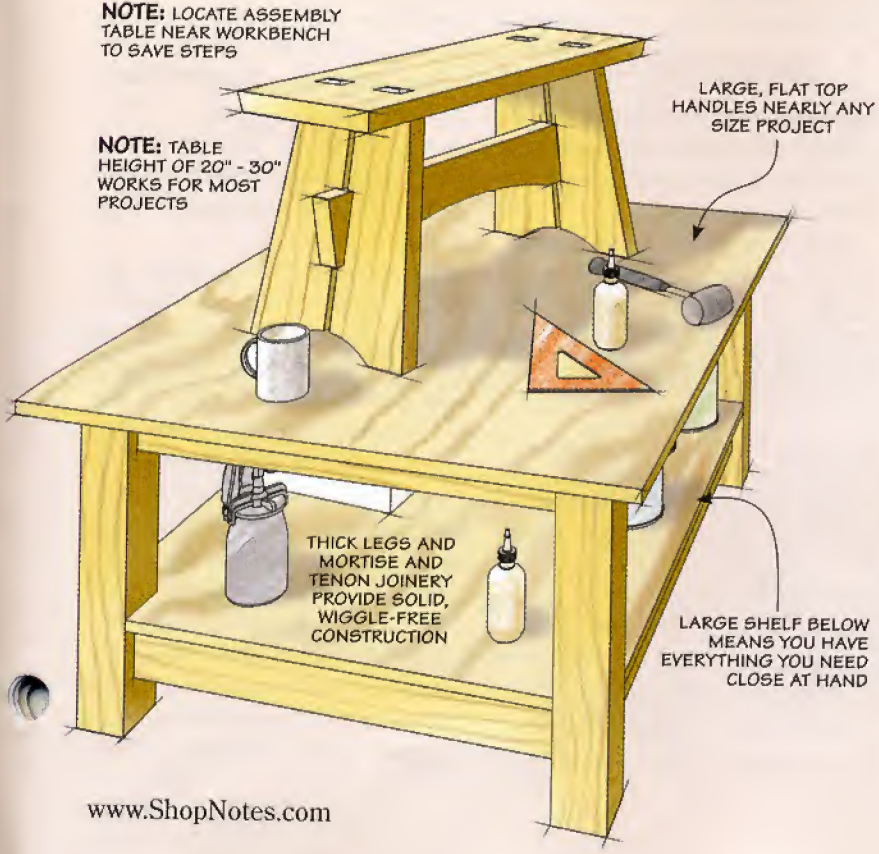
ULTIMATE ASSEMBLY TABLE

The two previous projects are both versatile and practical, but they do make tradeoffs in order to be tucked away easily. The "full-size" assembly table shown below is just the opposite. I like to think of it as my workbench's little brother — it's not as tall, but you can definitely see the family resemblance.

The advantages here are numerous. First, the lower height of the worksurface makes putting together a large project more comfortable. And the large, sturdy top has a wide overhang so that you can easily clamp workpieces to it. Plus, like the rolling cart, this table is built with stout legs and sturdy mortise and tenon construction. Finally, an ample shelf below means that I can avoid a lot of trips across my shop to get supplies.

Another thing worth mentioning is the location of my assembly table. It's close to my workbench so I can go from one to the other by just turning around.

Now you might think that one of these dedicated assembly tables would simply add clutter to a small shop. But you'll find that it actually makes more efficient use of limited space and time. There's no more downtime while waiting for glue to dry or trying to find space to store a partially assembled project. This way, your workbench will be clear to handle the tasks that it's best suited for.



crosscutting Wide Panels

Cutting wide panels doesn't need to be a chore. These simple techniques guarantee great results.

After gluing up a wide panel for a tabletop, the task of cutting it to finished size with a square edge presents a couple of challenges. For one, you typically can't use your miter gauge. That's because the miter bar is often too short to securely engage the miter slot before the blade starts cutting. Another problem is the face of the miter gauge doesn't provide enough of a bearing surface to keep the panel square to the blade.

The key to getting a clean, square cut on the end of a wide panel is having a straight and secure method of guiding the panel through the cut. Here are some simple ways you can make those cuts with confidence and without a lot of fuss.

STRAIGHTEDGE GUIDE

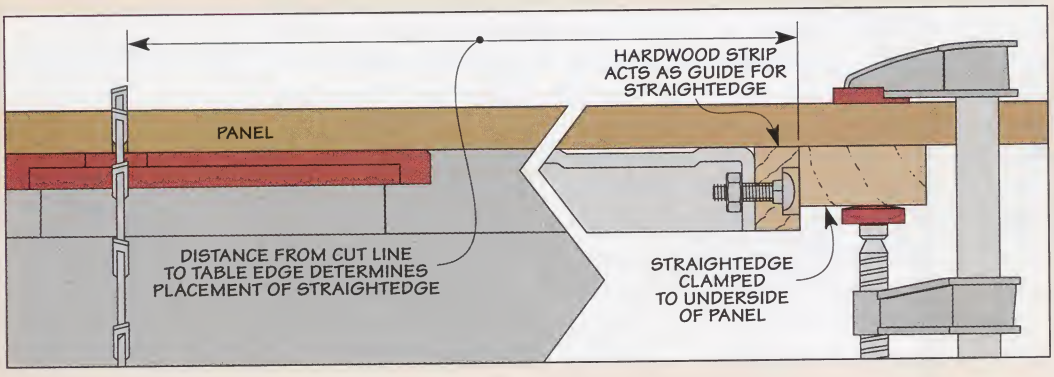
To get around the challenges of cutting wide panels, you can use the edge of your saw table along with a straightedge.

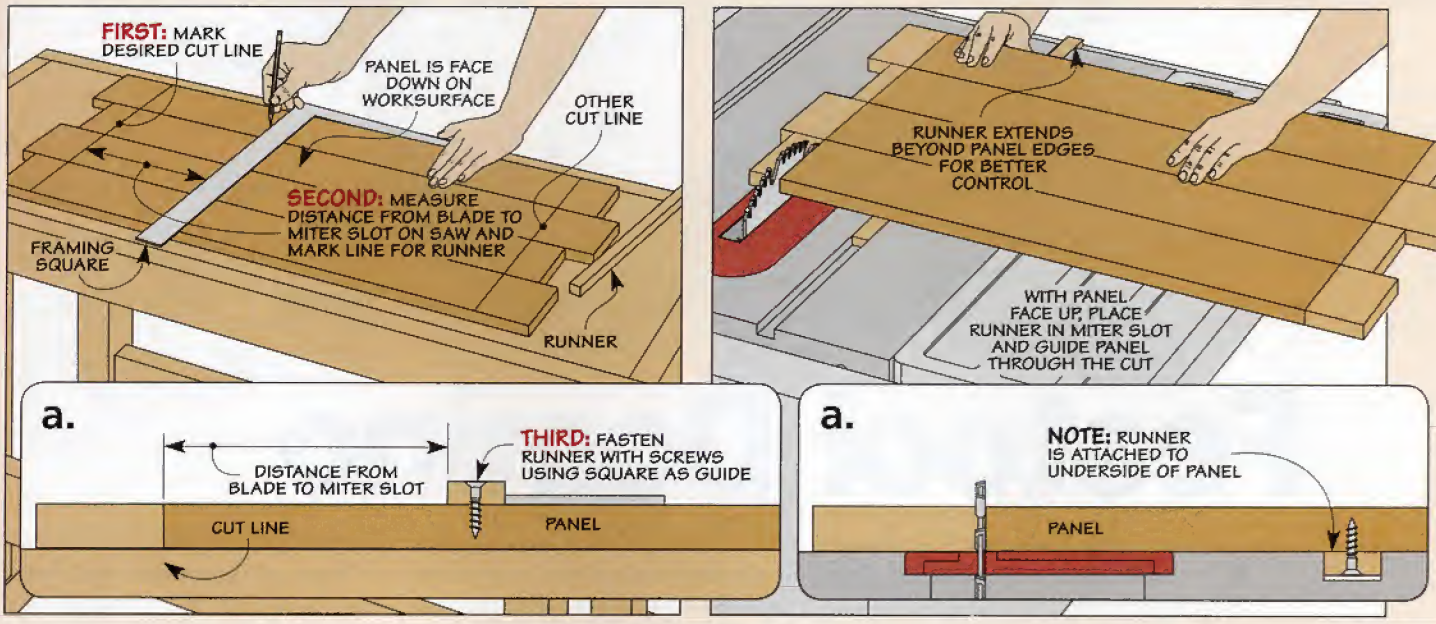
Reference Edge. If you look at the photo above, you'll notice a hardwood guide I fastened to the extension wing of my saw table. I did this for a couple of reasons. First, the hardwood strip provides a straight, smooth surface for the straightedge to ride against during the cut. Some extension wings won't have a smooth, straight edge on the outside edge.

Another reason for this guide is to make sure I have a reference edge that's parallel to my saw blade. (You may need to use shims.) This way, the cut will be straight and square.

Commercial Straightedge. In the photo above you can see how a self-clamping straightedge helps guide the wide panel across the saw. Just clamp the guide to the underside of the panel, making sure it's square with the edge of the panel. The straightedge is positioned to align the cut properly and runs along the hardwood edge of your saw table (main photo).

A Simple Board. If you don't have a straightedge like this, you can accomplish the same thing with a straight piece of hardwood and clamps (see drawing at left).





With this method, you can make the straightedge extra long to keep the panel square before, during, and after the cut.

Setup. With all that said, you need to know where to clamp your straightedge so the cut ends up where you want it. The drawing on the opposite page shows how to locate the straightedge.

Control. When it comes time to make the cut, it's important to keep the straightedge tight against the saw table as you slide the panel. (For extra help supporting longer panels, see the box below.)

RUNNER

There's another technique you can use. And that's to fasten a runner with screws to the underside of your panel to act as a guide. (You'll want to locate the screws away from the finished edge of the panel so they won't be seen.) The runner rides in the table saw's miter slot and "locks" the panel square to the blade, as shown above.

To make the runner, use a long strip of straight-grained hardwood. What's important here is that the bar slides smoothly in the miter slot, but without any side-to-side movement or play.

And you'll want to be sure the runner is long enough to extend past the front and back edges of the panel. This way, it will engage the miter slot and keep the panel straight through the entire cut.

Positioning the Runner. The drawings above show you how to position the runner on the bottom of your panel. It's a similar process to how you locate a straightedge, except that here, you need to know the distance between the saw blade and the miter slot.

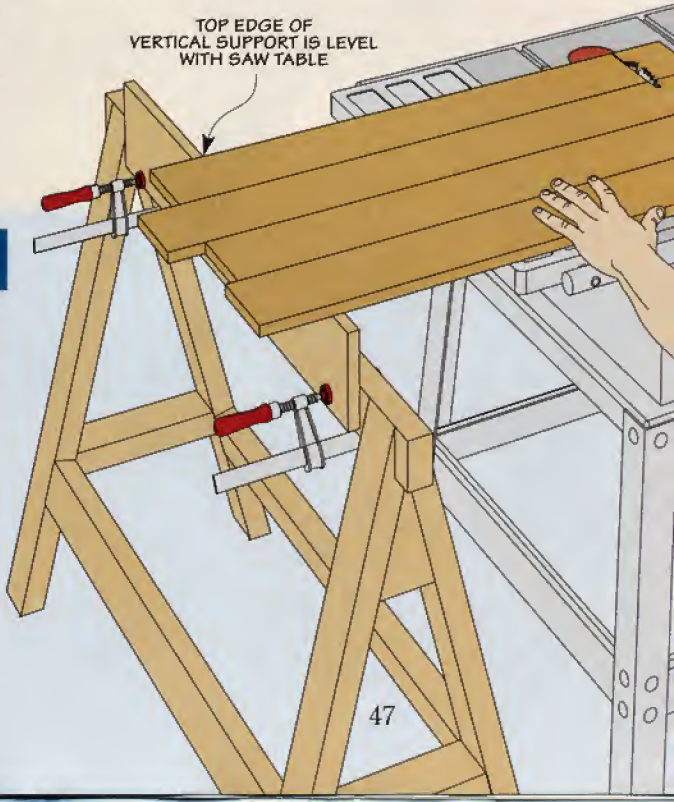
Preference. So when would you use a runner over a straightedge? I find that a straightedge works best with very wide panels. But for most panels and table tops, I like to use runners. Whatever method you use, the results are worth the effort.

Helping Hand: Supporting the Panel

A long panel can be difficult to control while making a cut on the table saw. But adding some support to the "loose" end can make all the difference in the world in getting good results.

The important thing to remember is that the end of the panel should be supported all the way through the cut. That usually means rigging up some sort of long support mechanism to the left of your table saw, like you see in the drawing. Something as simple as a piece of MDF or plywood clamped vertically to a saw horse will do the job nicely.

With proper support, you'll see the results in a panel that's easier to control for a cleaner cut.



Fast, easy joinery with the Festool Domino

Here's a new way to create rock-solid, loose tenon joinery.

Ten seconds — that's about all the time it takes to create and assemble a solid, long-lasting joint using the *Festool Domino* you see below. For more information on where to purchase the *Domino* refer to Sources on page 51.

How it Works. If you've ever used a biscuit joiner, you'll find the overall operation of the *Domino* joiner to be quite similar. You create an identical mortise on both halves of the joint and then add a manufactured tenon to connect the two workpieces.

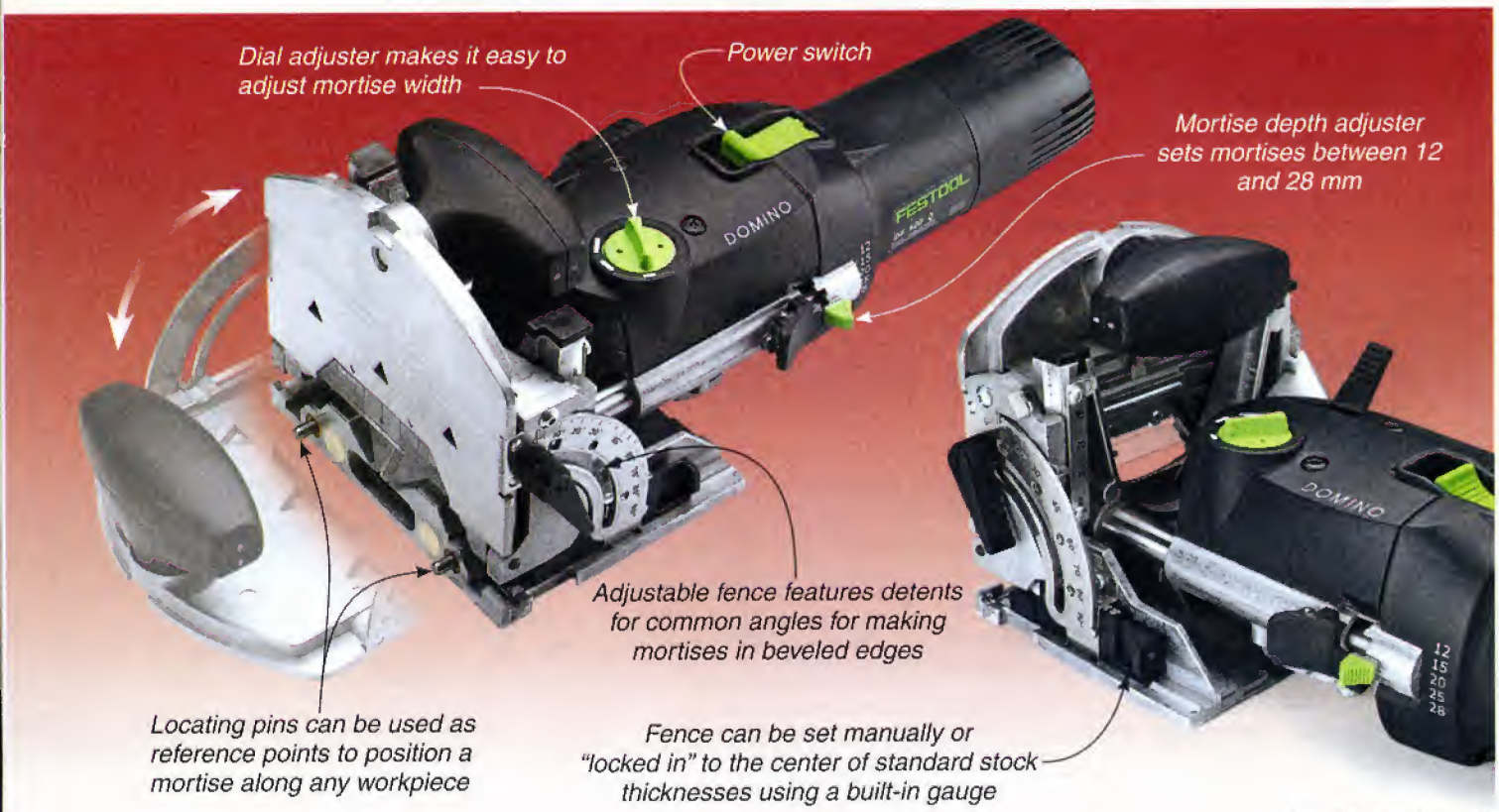
To do this, the *Domino* joiner cuts a perfect, accurately sized mortise by drilling and oscillating at the same time, as shown in the drawing on the opposite page. The two mortises are then connected by a loose tenon called a "*Domino*."

Dominoes. The shape of the *Domino* tenon, milled from solid beech, is similar to a game domino. The standard *Domino* tenon is 5x28mm (3/16" x 1 1/8") and is sized to match the mortise created by the 5mm bit that is sold with the joiner. (*Dominoes* are sold separately.)

There are larger bits and *Dominoes* available, as shown in the photo at the top of the opposite page. But you'll find that the standard size works just fine for most furniture and cabinet joints.

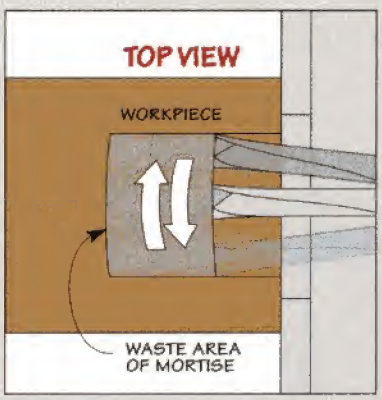
Metric. One of the first things you'll notice is all the gauges and adjustments are in metric measurements. While this is a little unusual, I found that after working with the tool, it was easy to make the adjustment to inches.

Adjustments. There are a number of settings on this joiner that



▼ **Domino Size.** *The standard size Domino is 5mm (left). Four additional sizes range from 6x40 to 10x50mm.*

▲ **Mortising Bits.** *Additional bits can be purchased separately to match different size Dominoes.*



◄ **Operation.** *The mortising bit rotates and oscillates simultaneously to make an accurately sized mortise.*

allow you to make a mortise at almost any angle and depth. The *Domino* has an adjustable angle fence to make accurate mortises referencing from any angle (0° to 90°).

The height of the fence can also be adjusted to let you set the position of the mortise on the thickness of the workpiece. I was able to place the mortises exactly where I wanted them using this. You can also set the depth of the mortise from 12 to 28mm (½" to 1⅛"), using the depth adjuster.

Finally, the joiner has an adjustment to set the width of the cut. A dial on the top of the tool, allows for three preset widths. This adjustment is handy when you're using the joiner to edge glue two or more workpieces. There's more information about panel joinery on the following page.

Instruction Manual. The manual that comes with the *Domino* covers the basic anatomy of the tool. Unfortunately it doesn't provide all the details I would expect for some operations. A couple of those are some key setup tips, which are detailed in the box below.

But don't worry, *Festool* will be publishing a more comprehensive instruction manual. It should be available soon on their web site.

Accessories. There are a few accessories that come with the joiner, including a stabilizing support that attaches to the baseplate. This support keeps the joiner from tipping when you're making a vertical cut. And there's also a small wrench included to separate the motor from the baseplate for access to the bit. This same wrench is also used to remove and install the bit in the tool.

On the next page you'll find a few basic tips for putting this tool to work in your shop.

Set-Up & Calibration

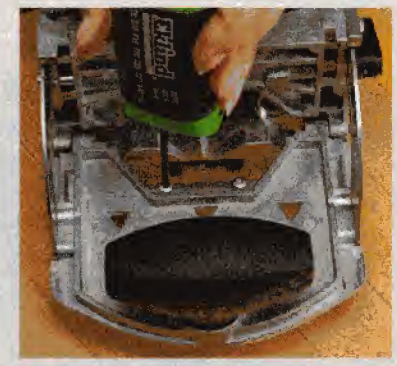
After making a couple of rail and stile joints with the *Domino* joiner, I noticed the pieces didn't line up quite flush. After talking to the folks at *Festool* about the problem, I learned there are a couple of calibrations you may need to make to get the best results.

Horizontal Sight Gauge. The first thing is to adjust the horizontal sight gauge on the fence. This gauge is used to line up the center of your workpiece with the center of the *Domino* bit and therefore the mortise.

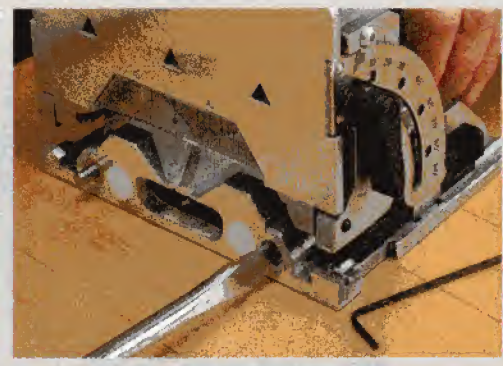
To calibrate this gauge, loosen the screws on the gauge, as shown in the first photo at right. Then turn the tool upside down and align the centerline on the gauge with the centerline on the baseplate. Once it's aligned, tighten the screws and recheck for accuracy.

Locating pins. The second adjustment that needs to be made is centering the locating pins (far right photo above). These pins, which are positioned on either side of the bit, can be used as a reference for making cuts on a workpiece for different joinery situations. The left pin is fixed, but the pin on the right side is housed in an eccentric bushing, which can be adjusted in small increments.

To check the accuracy of the pins, I cut a mortise on the edge of one workpiece using the left pin as a reference and on another workpiece referencing from the right pin. If the two ends aren't flush when you join them, you'll need to adjust the right locating pin a bit. Then just repeat the test cut and fit after each adjustment until the two parts are flush.



▲ **Sight Gauge.** *You can adjust the horizontal sight gauge by loosening the torque screws on either side of the gauge.*



▲ **Locating Pins.** *Loosen the set screw with an Allen wrench and then adjust the eccentric bushing with a screwdriver.*

Domino Joinery Basics

Once you become familiar with the *Festool Domino*, it's easy to see the wide range of uses it has. But there are a few things to consider when you make any type of cut.

Layout First. For a cabinet face frame, the first thing to consider is the initial layout of the joint. You'll want to mark the centers of the rails first. Then you can lay out the face frame according to your plan and make square, layout lines on the stiles and rails (photo at right).

To make assembly easier, the company suggests that you make one mortise a size wider, but if your layout is accurate, it's not necessary. Plus if the mortises are the same, I feel it's a stronger joint.

Basics. As I said before, the *Domino* is similar to a biscuit joiner, but one of the differences is the reference point for cuts. When cutting a mortise with the *Domino*, you should always reference the cut from the joiner's fence and not the base of the tool, which I often do with a biscuit joiner.

Marking the Center. *To ensure a tight, accurate joint, use a combination square to draw a line perpendicular to the edge (or end) of each workpiece.*

Also the end of the workpiece should extend off the workbench, as shown in the photo below. I found that if I made the cut with the tool resting on the bench, it was easy to tip and make a cut that was off-center or at an angle.

Finally it's always a good idea to secure the workpiece with a clamp so it doesn't move as you plunge the tool to make the mortise.

Auxiliary Handle. *Keeping a firm grasp on the handle with the fence resting on the workpiece stabilizes the tool and prevents tearout.*

Two-Handed Cut. I also realized after the first cut that I needed to use the auxiliary handle for every cut, as shown in the photo below. Keeping a firm grip on the auxiliary handle keeps the joiner tightly in place against the workpiece to ensure a clean cut. If the tool slips, it could tear out the sides of the mortise — ruining the workpiece and creating a safety hazard.

Edge Joining. Another use for the *Domino* is joining two or more workpieces together at the edges to make a wide panel. To do this I made a series of mortises down the edge of two boards.

In this case, the first mortise in each piece is used to align the ends, while the remaining mortises keep the surfaces of the workpieces flush. So you'll want to cut the first set of mortises at the same size. The remaining mortises can be cut one size wider along one edge, which ensures the joint will still come together if the mortises are slightly off-center.

The Cost of Efficiency. Paying $700 for a hand tool may seem a bit steep. But if you have a lot of mortises to cut in your shop, this is a fast, accurate tool and may be worth the money in the time you save on a project.

Sources

SPIRAL BITS

Most router bit manufacturers make spiral bits. The bits shown on page 8 are a ⅜" down-cut (46214) and a ¼" up-cut (46248) from *Amana*. *Amana* bits are sold at the *Woodsmith Store*.

WATER-BASED FINISHES

There are times when a water-based finish is the best choice. Clean up is easy and the durability of water-based finishes has improved greatly.

General Finishes, *Old Masters*, and other manufacturers all make water-based finishes. Check their websites for more information.

JIG SAW UPGRADES

Getting more out of your jig saw will be easy with the accessories beginning on page 12.

If your saw doesn't have a splinter guard, check a few retail outlets that carry your brand.

The *Slick Saw* adhesive overlay can be cut to fit your saw's shoe. *R Boog Industries* sells the overlays through specialty woodworking outlets. The company's website has a list of distributors.

The *Milescraft SawGuide* edge guide is available at hardware stores or home centers. We ordered it from *Woodcraft* (147761).

The *EasyCoper* will turn your jig saw into a power coping saw. You can purchase it from the *Woodsmith Store*, or you can order it from the manufacturer (listed at right).

TOOL BOX

Most of the hardware used to make the tool box on page 16 is available at your local hardware store or home center, but some items may be harder to find.

The aluminum angle (88805K57) and folding pull handle (1647A31) came from *McMaster-Carr*, as did the 3/16" x 5/8" low-profile, universal head rivets (97490A247) and the #8 washers (90126A512).

The lid supports (HG-7752), recessed pull handles (NSH-10), and draw latches (NSH-2271) came from *Reid Supply*.

MALLETS

Shaping the mallet on page 26 is easy with a router. To get a smooth finish, I used a bowl and tray bit. The bit (1376) is available from *Routerbits.com*. Just visit their website for details (listed at right).

MULTI-PURPOSE TABLE

The multi-purpose table on page 36 is designed to provide a solid, stable platform for working on hobbies and crafts.

The hardware used in this project, including the T-track (12K79.34) and rare-earth magnets (99K37.01), can be purchased from *Lee Valley*. The insert knobs (DK-82), drawer knobs (DK-77), leg knobs (DK-86), threaded inserts (EZ-14), and suitcase handle (AHC-4) were purchased at *Reid Supply*. The hold-downs (21912) and flange bolts (34771) are from *Rockler*.

The rich tan color for the leather top can be achieved with *Fiebing's* leather dye and *Tan-Kote* protective finish. These products are available at most shoe repair stores or you can check *Fiebing's* website for a store in your area (margin).

RUST PREVENTION

Keeping rust at bay can be a battle in the shop, but there are products designed to keep rust off tools.

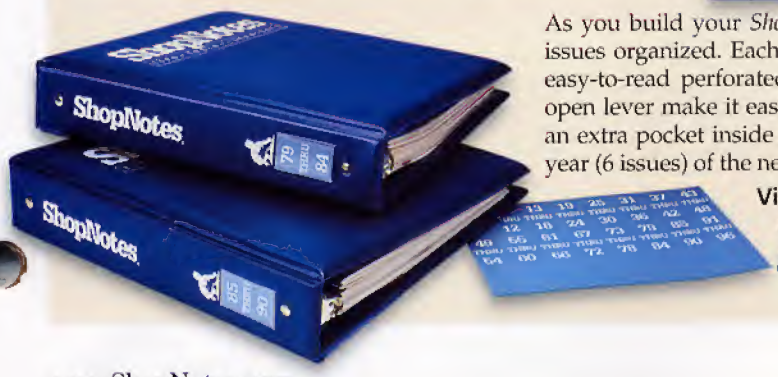
Boeshield, *Sandflex Rust Eraser* blocks, and other rust preventatives are available at *The Rust Store* (listed at right). You can also find *LPS Heavy-Duty Rust Inhibitor* at *Amazon.com* (margin).

FESTOOL DOMINO

The *Domino Joiner* is another great tool added to *Festool's* line. You can purchase it directly through *Festool's* website. It's also available through the *Woodsmith Store*.

ShopNotes Binders

Keep your issues organized!



As you build your *ShopNotes* library, here's a way to keep your issues organized. Each binder features durable vinyl covers and easy-to-read perforated number tags. Snap rings with a quick-open lever make it easy to insert and remove issues. And there's an extra pocket inside for storing notes. Each binder holds a full year (6 issues) of the new, expanded *ShopNotes*.

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MAIL ORDER SOURCES

Woodsmith Store
800-444-7527
EasyCoper, Festool Domino Joiner, Spiral Bits

Rockler
800-279-4441
rockler.com
Hold-Downs, T-Bolts

Lee Valley
800-871-8158
leevalley.com
Flange Bolts, T-Track

General Finishes
800-783-6050
generalfinishes.com
Water-Based Finishes

Old Masters
800-747-3436
oldmastrs.com
Water-Based Finishes

Routerbits.com
888-811-7269
routerbits.com
Bowl and Tray Bit

The Rust Store
877-256-9301
theruststore.com
Boeshield, Sandflex Rust Eraser Blocks

Amazon.com
amazon.com
LPS Heavy-Duty Rust Inhibitor

Festool USA
888-337-8600
Festoolusa.com
Festool Domino Joiner

Reid Supply Company
800-253-0421
reidtool.com
Knobs, Suitcase Handle

Fiebing's
800-558-1033
fiebing.com
Leather Dyes, Topcoats

Woodcraft
800-225-1153
woodcraft.com
Milescraft SawGuide

McMaster-Carr
609-223-4200
mcmaster.com
Aluminum Angle, Draw Latches, Folding & Recessed Pull Handles, Rivets

R Boog Industries
877-754-2572
slicksaw.com
Slick Saw Overlay

EasyCoper
336-375-9401
easycoper.com

Scenes from the Shop

Take your hobby or craft on the go with this multi-purpose table. The smooth leather top features T-track that makes it easy to secure a workpiece. And slide-out trays at each end provide quick and easy access to your tools. Finally, the entire table knocks down into a suitcase-size box that's easy to carry and store out of the way.
For detailed plans, turn to page 36.

Every workshop needs a good mallet or two. The article starting on page 26 covers everything you need to know to build the carver's mallet shown above. And on page 30, you'll find a handy cabinetmaker's mallet. The head of each mallet features durable, laminated construction that will stand up to years of use. And the handles can be shaped for a custom fit to your hand.

Storage and organization is a necessity in any shop. And being able to have it right where you're working is a bonus. The high-tech tool chest at right provides all that in a sturdy, lightweight design. *For more on the chest, turn to page 16.*